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Volume XXI Toronto, January, 1944 Number 4

The University of Toronto Medical Journal

(AN UNDERGRADUATE PUBLICATION)

This journal is published six times a year, November to April, by the Medical Society of the University of Toronto, to serve as a medium for student expression and to bring to the student recent articles of scientific interest.

$1.50 per volume. 25c. per single copy.

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EDITORIAL

HEALTH INSURANCE

SECTION IV

This is the final of this series of editorials in which the proposed Health Insurance plan (Heagerty Bill) has been discussed in its various aspects. This section is devoted to the position of the Practitioner under the Bill according to the following plan:

I. Relations of the Medical Profession to the State:
   - (a) Organized Medicine
   - (b) Individual Practitioner
     - (i) type of practice
     - (ii) records
     - (iii) disposition of personnel
     - (iv) disputes
   - (c) The political party in power

II. Relation of the Medical Profession to the Patient:
   - (a) Freedom of selection
   - (b) Type of care
   - (c) Specifically defined drug list

III. Fees:
  (a) Mode of collection
  (b) Conditions of collection
IV. Advantages and Disadvantages of Health Insurance in General.

I. Relation of the Medical Profession to the State.

(a) *Organized Medicine.* In recent publications by the government, it has become evident that they recognize the doctrine of collective bargaining. This is true not only in the case of Labour but also in the case of Medicine for the draft bill proposes to carry on such negotiations as are necessary between the State and the Profession through the medium of a representative body. The only existing bodies of this sort are the provincial components of the Canadian Medical Association. Therefore if one is to have a vote in the policies of the profession, then one is required to belong to the Canadian Medical Association or its branches.

(b) *Individual Practitioners.* A number of new restrictions will come into effect which affect the general practitioner.

(i) *The type of practice* which the practitioner can undertake will be directly dependant on his qualifications. If he has simple medical degree, then he will be allowed to do only general practitioner work which is to be specifically defined by the act. If specialization is desired, the practitioner must qualify according to standards laid down by the government. In major specialties, this may include as much as five years' non-remunerative work in the selected field.

(ii) *Records* are required to be kept by the practitioner if he expects to participate in the scheme. The bill designates these as clinical records "as prescribed" meaning that each patient will have a file composed of standard forms which must be filled out before payment for service rendered can be expected.

(iii) *Disposition of personnel* is a matter of interest to the junior members of the profession. No definite statement is embodied in the bill concerning this; however, in section 33, subsection 3, "If, as respects any particular area, in the opinion of the Commission, it is not reasonably practical to administer satisfactorily any one or more than one of the benefits of this Act under the general arrangements made for the administration therof, the Commission may by regulation made hereunder (a) make other arrangements for the administration of benefits in that area; or . . .". In other words the Commission has the power to see that a region receives medical services when it contains inadequate personnel.

(iv) The question of *disputes* is arranged so that any and all differences may be settled by the Health Insurance Commission of the province in question. (See Section III for the constitution of this Commission.)

(c) *The Political Party in Power.* This is of course the inherent weakness of any such system for an attempt at political control of such an enterprise could completely rob it of its merits. The profession should be on guard at all times to prevent any such inroads. In the United States, the American Medical Association has consistently opposed schemes submitted, on the ground that the political powers should have no voice in their administration. Even in Great Britain where this type of program has been in effect since the last war, there are continual frictions and disputes regarding the place of politics in the administration of the scheme.

II. Relation of the Medical Profession to the Patient.

(a) The patient under this scheme has complete and free choice as to what practitioner he employs and no contract exists between the patient and the doctor, so that a patient may at any time change from one practitioner to another. Such a system requires that the practitioner maintain his reputation amongst his patients and therefore will prevent slacking in the performance of his duties.

(b) The type of care under Health Insurance is apt to be somewhat different from that generally prevalent now. The specialist will continue his practice much as before but the duties of the practitioner, while limited in specialists fields, will expand in others. He ceases to be the medical consultant in a time of illness and becomes the medical counsellor of the family. He is expected to carry on a preventive medicine campaign as well as a therapeutic function. He will be responsible for immunizations of children, advice of all kinds concerning health of the entire family and perhaps in time a somewhat new function as a counsellor concerning food, clothing, dwelling, and other necessities of life. Thus the practitioner ceases to be primarily a therapist and becomes a practitioner of preventive medicine.

(c) A third aspect of this bill is the limitation of official remedies by the compilation of a standard formulary. Whether this is an advantage or a disadvantage is difficult to say. Such a formulary will be difficult to keep up to date and may not in many cases contain favorite prescriptions in which the practitioner has particular faith but on the other hand many of the patent medicines which he has heretofore been talked into using by drug salesmen will no longer be used, for the patient will as a rule be unwilling to expend the extra money for the drug when he can receive for no cash outlay an alternative preparation which is just as, or more, effective.

III. Fees.

(a) The precise method or methods of collecting fees has not been decided upon. The methods suggested are capitation, fee for service and salary. I do not propose to discuss the merits of each. However it appears to me that under certain circumstances each system has its advantanges and under other circumstances each has its disadvantages. If, therefore, it does not complicate the administration too much, the ideal system may well embody a combination of all three. The decision as to which or what system is to be adopted lies with the profession and is to be settled by negotiations between this profession and the government.

(b) *Conditions of Collection.* This presents an interesting aspect of this bill. As mentioned, each practitioner will be classified with the government as capable of certain types of practice. If he performs practice outside the realm of his qualifications he cannot expect to receive pay except in very extenuating circumstances. This preserves the field for specialists and prevents the inroads usually made by practitioners.

IV. Advantages and Disadvantages of Health Insurance.

On the disadvantage side of the ledger perhaps the greatest factors are (1) the risk of political interference and (2) the danger of slackness of practice on the part of the practitioner when his income is comparatively assured. The Bill

is constituted to avoid this as much as possible; however, it is difficult to anticipate all the aspects and certain practical loopholes may be yet quite unsuspected.

On the advantage side of the ledger there are (1) complete medical services for the entire population; (2) the necessity of keeping records, a point which in years to come will lead to a better practice of medicine; (3) the emphasis of preventive rather than therapeutic medicine; (4) classification of practitioners according to their capabilities, thereby eliminating to a large extent the practice of unfamiliar and difficult medicine by those untrained in it; (5) complete hospital facilities available to any practitioner for the treatment of his more difficult cases; (6) nursing services freely available when required; (7) drugs are supplied without cash outlay and they are are of known and tried effect; (8) dental services available up until the age of sixteen years and to be expanded as soon as possible. If all these services are made available to the general public it seems inevitable that in the future the level of medical standards must be inevitably raised.

The editor would like to thank Dr Harris McPhedran for his careful criticism and constructive suggestions in the preparation of these editorials.

The University has suffered greatly in the loss by death of three eminent members of the Faculty of Medicine: Dr. Alexander Primrose, Dr. D. E. Robertson, and Prof. W. H. Martin. This news reaches us as we go to press, with too little time to prepare adequate obituaries. These will appear in the next issue.

The consistently late appearance of the "Medical Journal" would be largely rectified if all contributions were **typewritten.** The staff of the Press are greatly overworked; it takes time to translate handwriting into print, and the task is made doubly difficult when medical terminology is used. Please co-operate by having **your** manuscript typed.

NOTES ON DESERT SURGERY

MAJOR-GENERAL OGILVIE, R.A.M.C.

PART II

But in war the surgeon is not the arbiter of his patient's fate, but one of a number of workers on a production band, similar to the mechanic in a tank factory who screws on some component and sends the chassis down the line to its final completion. An operation which may be quite all right when done in a first-class hospital where the patient can be kept until he is well, may be dangerous when he must be evacuated shortly after it, on a journey of unknown difficulty and often to an unknown destination. In war, therefore, the surgeon must do not what he thinks best, but what he knows to be safest. I will merely give two examples where methods that are excellent in peace time are inadmissible in war surgery

1. The suture of an accidental wound is a routine procedure in the traumatic surgery of civil accidents, except where there is gross soiling, because it ensures the quickest healing and the best final result afterward; but the patient remains in the ward, where he is seen by the surgeon or the interne daily, and the stitches can be removed at the slightest indication of trouble. But the suture of a recently inflicted war wound, however clean it may seem to be, when the patient must be evacuated shortly afterwards, is dangerous folly, so dangerous that the surgeon who has been guilty of it should be removed from a front line Unit. Suture prevents discharge and allows tension in the deeper parts, and a degree of infection that in an open wound might have been harmless may develop into a dangerous cellulitis, or even gangrene, before the man reaches the next hospital.

The closed plaster method of wound treatment is, as you all know, one of the outstanding advances of the last twenty years. It has proved eminently successful in the treatment of osteomyelitis and of compound fractures, and in the Spanish War and the Air Raid casualties of England, it was accepted as the best method of treating casualties. But the method depends for its efficacy on the complete immobilization, control of circulation and prevention of edema which is provided by an unpadded case carefully moulded to the limb. When such a close fitting plaster is applied to a recently wounded limb, and the patient is sent shortly afterwards on a rough journey—such as an ambulance ride over desert tracks or a stormy sea voyage — small hemorrhages and minor degrees of swelling are liable to appear which first obstruct the venous return, and rapidly block the whole circulation of the limb. In the Middle East we were forced to issue instructions that all unpadded plaster cases be split before evacuation. This precaution is not entirely satisfactory for an unpadded case split along one side opens like an oyster shell and makes a badly fitting splint, with not much more room than before. There is, therefore, an increasing tendency to use padded plaster splints or some combination of a plaster slab with skeletal splints such as the Tobruk plaster for the lower limb and the thoraco-brachial or Alamein plaster for the upper limb, which became standard in the Middle East.

Once the patient has reached a base hospital, the unpadded case once more becomes safe and it is probably the best method of treatment for the majority of fractures of leg bones.

Fourthly: The lessons of the last war, the war in Spain and Air Raid casualties

in England which largely dominate the books and articles that have been written on war surgery are not necessarily applicable to the surgery of 1943. Whatever it may be politically, surgically this is a fresh war and it demands a fresh orientation. The men are different, the weapons are different, the wounds are different, and we have many methods of treatment that were unknown even five years ago.

In general it is undoubted that the results in this war are very much better than in the last, and that the wounded man has a much better chance than his father had. He is not so likely to die. He will not suffer so much. He will get well quicker and he will recover better function. It is difficult to give any figures on the mortality rate, but I heard Major General Kirk, the head of the United States Medical Services, tell an audience in Philadelphia that the mortality in forward units had been reduced from 15 per cent in the last war to 2 per cent in this one.

There are many factors contributing to this improvement and it is impossible to attach to each its relative importance, but they must all be taken into account.

(a) The men are fitter. The soldier of today is, on the whole, taller and better built than the soldier of the last war. He has lived for twenty-five years in a world where the social, economic, industrial and nutritional conditions have been improving rapidly, and he starts with an excellent physical background.

(b) His condition at the time he goes into battle is very much better. The men who went over the top in the last war had usually been standing for three or four days in battered trenches, stuck to their waist in mud, cold and sleepless, deafened and dazed by three-day bombardment, and having fed and drunk very little during that time. The soldier of 1943 may drive to battle in a motor car, having breakfasted off two eggs and four rashers of bacon, had a hot bath and changed into a clean suit of clothes. I know that this is not the usual picture and that on many fronts men have suffered and are still suffering extreme hardships, but, on the whole, mechanized war has meant that the soldier goes into action quickly and is spared a period of previous exhaustion.

(c) Resuscitation is very much better, indeed resuscitation as practiced today is a science that was unknown in the last war or even at the beginning of this one. You will remember that the blood groups were first discovered and transfusion was first introduced in the first world war. At the end of it a transfusion of two or at most three pints of blood was considered to be as far as resuscitation could go, and if the wounded man had not recovered after this amount, "irreversible" shock or some unknown factor was thought to be responsible for his failure to respond. During this war, and particularly during the battles of the last year, we have learned to give blood and plasma in larger and larger amounts, to give it further forward, to give it earlier, and to give it more rapidly. I might almost say that at the present time no man is looked upon as a corpse until he is buried if we have sufficient blood to pour into him, if he has the veins to pour it into, and if the hole from which it is escaping can be repaired.

The following figures show how the amount of blood and plasma used has increased during the recent fighting.

Battle	*Pints per 100 wounded*	
	Plasma	*Blood*
Alamein	18	20
Mareth	20	46
Enfidaville	9	24
Sicily	45	45

It appears, therefore that body fluids should be provided in the proportion of one pint to every expected casualty. Given abundant supplies and a free choice, transfusion officers tend to use 2½ pints of blood to one of plasma, for when a man has bled considerably he gets well quicker and remains well longer after blood transfusion, but in beach landings, commando raids, airborn expeditions and all difficult fighting, plasma is the only fluid that can be used. Dried plasma from Britain and Canada and liquid plasma and blood from the base units in Cairo and Tripoli have always been available in abundant quantities right up to the front line, but on an occasion, such as the first weeks' fighting in Sicily, blood could not be supplied, since the refrigerator vans in which it is sent up to the front line were not allowed to run their engines in the closed holds of the tank landing craft.

(d) The use of sulphonamides has entirely changed the picture of infection. It is true, of course, that the wounds remain bacteriologically infected, for the drugs are bacteriostatic and not bactericidal. But the tissues around them remain of normal appearance, the limb is comfortable, and the man is well—that is, general infection of the patient is prevented. We had a striking example of the value of sulphonamides during the first week of the battle of Alamein. At this time the forward surgical units were overwhelmed and had to confine their work for the most part to abdominal wounds and cases of severe hemorrhage so that all patients who appeared likely to stand transfer without detriment were evacuated through to the base. On one day fourteen hundred patients arrived in two convoys at a group of base hospitals near the Suez Canal. Their wounds were from 36 to 48 hours old and they had received no local treatment beyond the first field dressing and the application of splints, but they had all had sulphonamides by mouth. In this group of 1400 only forty-six needed urgent surgical treatment. When this picture is compared with that in March 1918 when the Germans broke through in France and the wounded came down as far as Rouen without surgical treatment, the value of chemotherapy will be realized; at that time at least one man in three of the casualties was seriously ill with extensive infection or gas gangrene. The difficulty with sulphonamides in a theatre of war is to ensure adequate administration. We have come to believe that the local use of the drugs is not as effective as the systemic use except possibly where infection is limited to a surface as in burns or peritonitis. It is difficult, however, to ensure that four-hourly dosage is carried out under war conditions. When we tried it we found many men arriving with their sulphonamide tickets incompletely filled in and no idea as to how many doses they had taken. For the Battle of Alamein our Director of Pathology introduced a striking label, yellow with purple borders, enscribed with morning and evening entries for five days. This label was tied to every patient who was put on sulphonamide treatment, and at 8 hours and 18 hours every man bearing the label was given five tablets. The value of this method is that it is fool proof. The Medical Orderly is not a fool, but there is very little difference between a fool and a wise man who has ten times as much work as he can possibly cover. By this method when eight o'clock comes around, in plane, ship, train or ambulance, every man with a label hanging on his jacket gets his five tablets and there are no failures. I asked Colonel Buttle to test the blood levels obtained by this method of administration on four normal officers, and he found that

the lowest figure was 2½ mgm. per hundred cc. in one man between the first and second dose, but that thereafter they all kept a level of at least 4 mgms.

(e) Immoblization is much better partly because we have abandoned some useless traditional splints such as the arm Thomas, chiefly because plaster has come into its own.

(f) Transport is also immensely better, allowing us to get special cases into the hands of skilled teams at the base with very little delay.

I will conclude my talk by a list of the seven deadly sins of war surgery.

1. Unnecessary operations on simple through-and-through wounds.
2. Removal of skin, a useless procedure unless suture is contemplated, as in head and abdominal wounds. Skin is, of all structure, the most viable, the most resistant to infection, and the most irreplacable.
3. Transverse division of groups of undamaged muscles.
4. Insufficient slitting of deep fascia.
5. Tight plugging of wounds.
6. Unsplit plasters.
7. Unnecessary amputations for gas cellulitis.

I should be the first to admit that I have been dealing with a special period of warfare, one of very rapid movement, over a country that has been described as the "Tactician's Paradise and the Quartermaster's Hell." Such condtions may not, indeed, are not likely to be repeated. Nevertheless they have shown that surgery better than has been done in war can be carried out under very simple conditions if the surgeons are right and the methods are right. Men who have learned their wound treatment in this hard school, will find their experience stands them in good stead when they come to work in a civilized country, moving on good roads operating in buildings, lacking nothing in supplies, and stationed behind a line that cannot be overwhelmed.

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HISTORY IN DISEASES OF THE OESOPHAGUS

E. E. CLEAVER, B.A., M.B., F.R.C.P.(C.)

Every medical student who is interested in the study of oesophageal diseases knows that it is necessary to use every method of investigation in order to arrive at a correct diagnosis, but frequently over-emphasis has been placed upon these special procedures. Radiological examination and oesophagoscopy are valuable aids to a correct diagnosis but a critical analysis of the clinical history is of paramount importance.

A correct interpretation of oesophageal symptoms and an appreciation that symptoms arise as the result of obstruction of the oesophagus must be understood. The The cardinal symptoms in oesophageal disease are (1) dysphagia; (2) discomfort in chest related to swallowing; (3) regurgitation of unaltered food with mucous and sometimes blood. In early oesophageal obstruction, the first symptom is not always dysphagia. Frequently the patient has a sensation of oppression and cough beneath the sternum for weeks before difficulty in swallowing is appreciated. This sense of discomfort is probably due to the slight dilatation of the oesophagus. above the point of obstruction. The colicky sensations are due to muscular constriction of the oesophagus in an effort to force the contents of the gullet through the point of constriction. The sensations are usually present when swallowing is attempted but may be independent of deglutition. In order to overcome this sensation of oppression, the patient takes considerable fluid in an effort to force the contents past the point of obstruction. Although the early symptoms may not definitely suggest obstruction, later the most constant symptom is dysphagia.

A careful and detailed history of the development of symptoms is necesary. When did the first symptom appear? Determine whether the symptoms commenced suddenly or gradually. The progress of the symptoms since their onset is to be noted. It is important to determine whether the disability has remained constant over a considerable period of time or whether it is getting better or worse, or whether complete freedom from symptoms occurs and if so when this happens and how long before further difficulty occurs.

Careful attention must be paid to history of swallowing any foreign body or corrosive fluid. The physician must carefully enquire whether there has been a mental or emotional upset prior to the onset of symptoms.

Cancer of the oesophagus is the most common lesion and is responsible for 35 to 40 per cent of cases of oesophageal obstruction. Dysphagia is not usually the earliest symptom in cancer of the oesophagus. Before actual difficulty in swallowing arises, the patient may experience a sense of weight or fulness behind the sternum which may or may not be related to swallowing. Actual pain in the early stages is most unusual.

Some patients may notice occasional choking sensations while eating and transient attacks of difficulty in swallowing. Again, other patients may complain of loss of appetite or a sense of discomfort high up in the epigastrium which may suggest a lesion in the upper part of the stomach. In the later stages, dysphagia is the most constant symptom. It makes its appearance at different stages in the course of the disease and is due either to spasm of the wall of the tube occasioned by the presence of the growth or the presence of a tumour obstructing the lumen of the

organ. The dysphagia is generally progressive, at first noticed with solids, later with semi-solids, and lastly with liquids.

Pain as mentioned above is absent in the early stages and not infrequently is conspicuously absent throughout the whole course of the disease.

Vomiting. This is not true vomiting, but a regurgitation of unaltered food, mucous and sometimes blood.

Haematemesis occurs frequently in cancer of the oesophagus. Sometimes a small amount of blood is regurgitated and occasionally a profuse haemorrhage may result in death.

Cardiospasm is most common benign lesion of the oesophagus and its incidence is between twenty-five and thirty per cent. In the early stages a feeling of discomfort in the chest is often associated with the act of swallowing. Occasionally symptoms commence suddenly, perhaps in the midst of a meal; this is especially true in neurotic patients and often follows an emotional upset. When stoppage of food occurs the patient often drinks large quantities of water in an effort to force the contents of the oesophagus into the stomach. After a meal frequently there is a sensation of weight or discomfort, usually referred to the epigastrium. Acute pain may be experienced and will generally continue until the food passes into the stomach. Frequently the patient feels and hears the event happen. In the later stages, regurgitation takes place more frequently. Sometimes the patient may be awakened out of sleep with a violent fit of coughing, due to entrance of oesophageal contents into the bronchi. In this stage increased salivation and frequent hiccough occurs.

Diverticulum of the Oesophagus

The early symptoms are slight difficulty in swallowing, a scraping or roughness in the throat often associated with a sensation of dryness. Later, glairy mucous, increased salivation and a frequent desire to cough are important symptoms. In about one-third of cases of diverticulum, gurgling sounds in the throat while swallowing is a definite symptom. A clear picture arises when the diverticulum becomes palpable. The dysphagia is then frequently characterized by more difficulty with fluids than solids, although this is not an invariable rule. Frequently there is a long history of rapid eating and bolting the food.

Ulceration of the Oesophagus

Chronic peptic ulceration of the oesophagus has been considered a rare condition, but a careful study of medical literature reveals the fact that several groups of cases have been reported.

In this disease, the patient often complains of pain in lower sternal region, sometimes coming on a half to an hour after meals and relieved by taking food or an alkali. Pain is often worse when the patient is lying down and may be relieved by change of position. Again, pain may radiate to both shoulders and sometimes down one or both *arms*. Pain of a burning character is sometimes felt when patient bends forward. Very hot or cold drinks, acids, condiments, etc., frequently produce pain. *Dysphagia* may be present from the onset of the disease but generally develops after the pain has been present for some months. This symptom is not present until obstruction develops. The obstruction may be due to either spasm or actual stenosis or both. Great distress may be experienced if stenosis is complete and the patient is unable to belch gas from the stomach into the oesophagus. Haemorrhage is generally not an early symptom but usually follows a long history of pain and dysphagia. Severe anaemia frequently

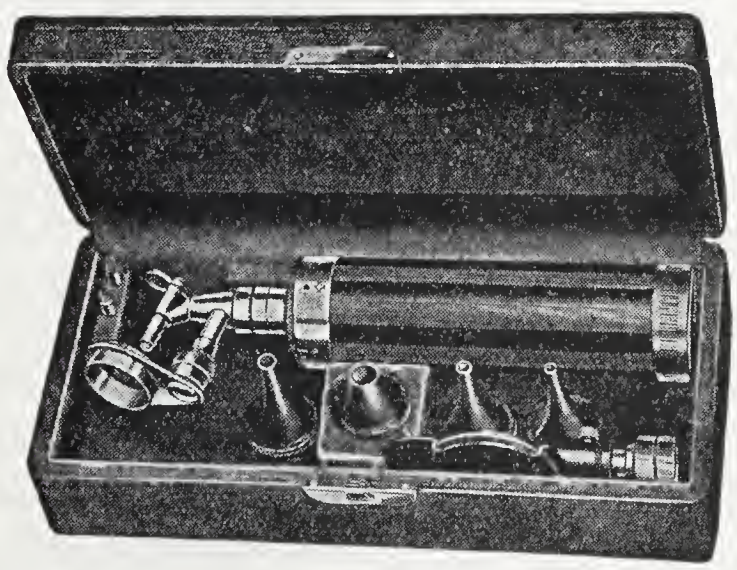
results from a large haemorrhage or repeated small haemorrhages.

The value of the careful analysis of a clinical history is illustrated in the case cited below.

A woman of seventy years of age consulted the author on account of difficulty in swallowing for twenty years. She stated that she had difficulty in taking sufficient food to maintain her nutrition. She was only able to take fluids and semi-solids in very small quantities. It was impossible for her to take an ordinary meal at one sitting. There was no history of regurgitation of food. She had never swallowed any corrosive fluid. She had always been a careful and slow eater; no history of any enlargement in the neck; she had never experienced any gurgling sensation in the throat.

Her body weight at the commencement of her illness had markedly fallen but there had been no appreciable change in weight during the last few years.

An attempt was made to arrive at a diagnosis from the above history. The most common lesion of the oesophagus is carcinoma. Evidently the history of *twenty years* practically ruled out malignancy. Cardiospasm, the most common benign lesion, is most *unlikely*. After twenty years there would have been marked dilatation of the oesophagus with regurgitation of food and mucous. The obstruction was not a stenosis due to scarring and cicatrization, and there was no history of taking any corrosive. Diverticulum of the oesophagus was not a probable diagnosis. There was no history of *swelling* of the neck such as seen in about one-third of the cases of diverticulum. Also there was no history of gurgling sensations in the neck. The history did not support the diagnosis of carcinoma, or cardiospasm, or cicatricial stenosis, or diverticulum, or ulcer. Elimination of the above conditions led the author to the probable diagnosis of web of the oesophagus. Further investigation including x-ray and laryngoscopic examination confirmed this opinion.



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A MEDICAL OFFICER'S NOTES ON THE OCCUPATION OF KISKA

CAPTAIN G. ALAN LANE, R.C.A.M.C.

The occupation of Kiska by the 13th Canadian Infantry Brigade on August 16, 1943, in conjunction with American troops proved to be quite a unique, and in many respects, a valuable experience. Most of the value comes from actual participation in manoeuvres of this nature so that little of specific benefit can be passed on in an account of this nature. However, it was thought that these notes might be of interest to readers who in the very near future may well find themselves taking part in similar expeditions.

Operations in the Aleutian theatre are rendered somewhat unique by a number of circumstances, chief amongst which are the weather and the country itself. To appreciate this a brief description of the country seems pertinent.

The Aleutian chain consists of about one hundred and fifty small islands extending some thirteen hundred miles off the Alaskan Peninsula. The chain separates the Bering Sea from the Pacific Ocean. As a result of the confusing attempts to portray a globe on a plane surface, it is not generally realized that the tip of Kiska reaches down to the same latitude as Vancouver Island, although it is some three thousand miles further west. These islands are volcanic in origin, and on many of them the volcanoes are still active. Such growth as is present is plastered on a substratum of volcanic ash. The islands form an exception to the general coast topography of the rest of the continent. The rocks in many places descend precipitously into the sea. Beaches, when present, are squeezed in between rocky headlands and their approach is often hazardous because of weather and half submerged rocks.

The terrain itself is quite rugged and in places precipitous. Everywhere the ground is cut by numerous small fresh water lakes and streams. There is not a stick of wood, tree, or shrub to be found. Natural protection is exceedingly limited to say the least. The islands generally appear desolate, dismal and drab, and yet even their desolation results in a sort of natural beauty that is rapidly lost sight of after the first two days spent there. Except for the volcanoes and the higher ridges, the hills and valleys are thickly plastered with tundra. This is an abundant green spongy growth that is peculiar to Polar regions. The word tundra is of Russian origin and is the name applied by them to the cold barren treeless wastes that border on the Arctic Ocean. Walking on this growth is like walking on a gigantic spring mattress, into which one's feet sink for a foot or more with each step that is taken. As a result, walking is extremely fatiguing and until one becomes conditioned it is quite an arduous task to cover any distance. Stretcher bearing is almost superhuman work. In summer the tundra is spangled with small wild flowers and carpeted with white mosses and lichens. There are no trees or shrubs. The only tree in a stretch of about fifteen hundred miles was a small scrubby six-inch pine tree that had been carefully transferred from the mainland and was on exhibition as a "National Forest." During the warmer weather the surface thaws to form a vast bog, or tundra-moor which is probably unequalled anywhere in those qualities of cohesion and adhesion which make mud the objectionable substance that it is. Vehicles become hopelessly mired in short order and after a

rainfall the only method of getting forward supplies or equipment is by foot.

Kiska itself is the same as the general run of the islands. It was probably chosen by the Japanese because of its large, protected, natural harbour. The island is about twenty-five miles long and varies from three to eight miles in width. Its volcano is four thousand feet high and lies at the northern tip of the island. There are several beaches suitable for landing operations and full advantage was taken of these in the actual occupation.

The only inhabitants of this long chain of islands are some two thousand Aleuts (pronounced "alley-oot"). This name is derived from the Chukchee "aliat," meaning island. While Aleut culture, such as it is, contains many typical Eskimo traits, both culturally and physically the Aleuts are more closely allied to the peoples of the North Pacific coast.

The climate is weird and unpredictable. Kiska is known as the storm pot of the world, and it certainly has the ingredients wherewith to brew a terrific storm. The warm Japanese current encountering the cold Bering Sea constantly and persistently hangs a curtain of fog around the island. When the high wind dispels the fog, it is usually accompanied by a driving rain that is even more objectionable. There is a saying on Kiska that all one needs for protection is four walls. The rain comes in so horizontally that no roof is necessary. The statement is also made that "it never rains on Kiska. It just rains in Siberia and blows over there."

This, then, was the sort of country that we were determined to wrest from the Japs. All I have to say is that it is small wonder that they did not make much of an effort to keep it. Our unit having been warned for duty, we were sent to the West Coast for special training in combined operations. On arrival, we were subjected to a form of training that might be entitled "How to become a Commando in Ten Easy Lessons." Once this was under our belts we set sail for the Aleutians, where we were to carry out further training prior to the attack. Here we practised landing operations and similar tactics that would be of use in the real attack on Kiska. The difficulties encountered in transferring oneself and one's equipment from ship to landing craft were rather ludicrous at times. At other times it was just plain hard work. The term "dry landing" is purely relative. Often it looked as though we were making an attempt to bail out the Bering Sea using our rubber boots as a medium. The Bering Sea incidentally is still the coldest collection of water this side of the freezing point.

Once we were proficient, preparations were made for the big attack The fact that we sailed on Friday the 13th did not deter us in the least. The day of the invasion came and we rushed eagerly to the side of the ship to see what Kiska looked like. The appearance was typical; we saw nothing but a blanket of fog. How anyone could tell that there was an island under it was beyond me. However, by the time we were in position off the north shore of the island, the fog had cleared and we had a good view of our future home. The actual landing was very similar to the trial runs we had been practising. This time there was a little more tenseness and excitement as we expected a warm welcome. However, everything went off without a hitch and we soon found ourselves on a great expanse of beach on which we were to set up an aid station. Once this was done we sat back to wait for casualties.

The weather was still clear, very exceptional for Kiska, and we amused ourselves by exploring the island and the foxholes

and buildings left by the Japanese. Shortly after we landed I hitch-hiked over to Kiska village to see what there was to be seen there. The road over was very rough and my perch on top of a snow jeep was, to say the least, somewhat precarious, particularly as at this stage we were still carrying rifles, and I had to use one hand for that purpose while trying to maintain my position with the other. Kiska village was nothing but a heap of well-bombed rubble by the time we landed there. Most of the huts were in ruins, and the ones that were not were so dirty that no one would want to live in them anyway. However, when it started to rain, as it did shortly, we were forced to take refuge wherever we could. Some of the boys up in the hills were not as fortunate and had to spend the night in Jap foxholes. That was fine, except that by three o'clock in the morning the foxholes were all full of water and it was drier out in the open, anyway. Being a little in advance of our supply line at this stage, we were living on field rations until we found a cache of Jap rice and salmon. There was also a store of saki, but of course no one would drink it. It tasted very much like wine.

Of particular interest was the Jap hospital. It consisted of a long branching tunnel dug into the side of the hill. There were small rooms off this tunnel at intervals. Stores of medical supplies and surgical instruments were found and many of them were grabbed up by the medical personnel as souvenirs. Souvenir hunting was a great pastime, incidentally, albeit at times a dangerous one as the Japs were not above leaving some TNT under the more delectable specimens. The Americans in particular are noted for this trait; so much so that a Japanese prisoner on Attu once remarked "I can understand what the British are fighting for. I can understand what the Canadians are fighting for. But you d--- Yankees seem to be fighting for souvenirs."

And so we settled down on our little island paradise and started to dig ourselves in for the winter. Our amusements were few and our duties were light. Life was reduced to its simplest terms, with a few exceptions of course. However, there is one thing about life under conditions such as these, conditions that probably occur very rarely outside the army; and that is the opportunity to live with and to get acquainted with one's fellow men. The friendships formed at times like this are very real and very lasting, as many who were in the last war will testify, and to me at least it was a real privilege to live with and work with the officers and men who took part in the invasion of Kiska.

CONTINUOUS CAUDAL ANAESTHESIA IN OBSTETRICS

With a Report of the Toronto Cases

W. R. HARRIS, 4T5

PART I

DEFINITION

Lundy defines caudal anaesthesia as nerve blocking produced by the introduction of an anaesthetic fluid into the epidural space by means of a needle passed through the sacral hiatus. *Continuous* caudal anaesthesia is caudal anaesthesia which is maintained indefinitely by means of repeated injections of the anaesthetic solution, each injection being given through the same apparatus before the effects of the previous injection wear off. Because the anaesthetic solution lies in the space outside the dura mater, the procedure is also called epidural or peridural block. It is to be distinguished from

(1) Spinal anaesthesia, in which the anaesthetic is introduced into the subarachnoid space;

(2) Transacral block, in which the anaesthetic is introduced through the posterior sacral foramina;

(3) Presacral block, in which the anaesthetic is introduced into the hollow of the anterior surface of the sacrum where it affects the sacral nerves as they leave the anterior sacral foramina.

The confusion existant in the nomenclature is no doubt due to the use of the term "sacral block" as a sort of generic name for any or all of the above procedures.

HISTORY

Man's search for methods of relieving pain is one of the most interesting chapters in the history of medicine. Authors from the earliest antiquity down to the present day describe the efforts to relieve human suffering: the effects of poppy seed and of indian hemp were well known to the ancients both of the Mediterranean world and of the Orient. Many and varied were the methods primitive people used to relieve pain, the most interesting of which was that of the natives of Peru, who were in the habit of chewing the leaves of the coca plant to allay fatigue. Cocaine was isolated from coca leaves by Niehmann in 1860. Niehmann and his teacher Wohler discovered the effects of cocaine when placed on the tongue, and knew that it deadened nearly all sensations in that organ. Karl Koller in 1862 accidentally got some of the drug in his eye, and discovered that it produced complete anaesthesia. Von Anrep in 1871 established its properties when injected under the skin. With this discovery, and the concurrent invention of the hollow needle, the progress of *local anaesthesia* made rapid strides. At first, cocaine anaesthesia was confined to local infiltration of the nerve endings. In attempting to produce greater areas of anaesthesia, the anaesthetic solution was injected closer and closer to the spinal cord, and thus a nerve trunk was blocked, producing anaesthesia over the distribution of that nerve; nerve plexuses were blocked, producing anaesthesia of a whole extremity, and finally in 1885 Corning suggested that the anaesthetic solution be placed in the epidural space, thus anaesthetizing all the nerves as they left the dural sac. Corning's idea was to inject the anaesthetic through an inter-

vertebral foramina. The method was not tried in man until 1901, when Cathelin introduced anaesthetic solution into the epidural space through the sacral hiatus. In other words, Cathelin was the first to use *caudal anaesthesia* as we understand it today. Cathelin used it to relieve pelvic neuralgias and bed-wetting in children. In the original technique a single injection was given, which produced anaesthesia lasting about half an hour with the drugs then in use. From the beginning the technique spread rapidly over Europe, and was used quite extensively for surgical operations involving a perineal approach, as well as for operations on the lower limbs. Stoeckel appears to have been the first to use it in obstetrics in 1909, and by 1913 Schlimpert reported on 200 deliveries in which caudal anaesthesia had been used. Coming as it did in the hey-day of Twilight Sleep, as well as the fact that analgesia often wore off before delivery was completed, caudal anaesthesia for obstetrics never acquired much popularity either in Europe or in America. The method was introduced in America in 1923, and received some popularity for surgical procedures. In this regard the method has been perfected by Lundy of the Mayo Clinic, who has managed to obtain anaesthesia for two to two and a half hours when using a single injection.

In 1940, Lemmon described a method of producing continuous *spinal* anaesthesia. In 1942, Hingson and Edwards adapted this method to caudal anaesthesia, and were successful in obtaining *continuous* caudal anaesthesia. This was undoubtedly a tremendous advance in the field of obstetrics, for they could indefinitely prolong the duration of anaesthesia and thus could start the anaesthetic early in labour, eliminating not only the pain of delivery but also the pain of the *first stage* of labour. In other words, Hingson and Edwards accomplished what the public now refers to as "Painless Childbirth" Since they first used this method, the literature has been filled with enthusiastic reports of its use. Its reception has ranged from the unwarranted enthusiasm of lay magazines to its cautious acceptance in most of the medical journals.

Anatomy

The sacrum represents the fusion of what was originally five separate sacral vertebrae. Their blending has produced a bone wedge-shaped in both its antero-posterior and transverse diameters, and locked between the two iliac bones and attached to them by joints and ligaments. It is curved so that its concavity faces forwards. It is placed at an obtuse angle to the lumbar spine, so that it lies obliquely, with its upper end farther anterior than its lower end.

The sacrum is traversed by a canal which conforms to the curve of the bone. Its anterior wall is formed by the union of the sacral bodies, and is therefore somewhat rough. Its posterior wall is formed by the fusion of the sacral lamina, and is therefore thin and smooth. Running laterally from the canal between the pedicles of each sacral vertebra are channels which shortly divide to form the anterior and posterior sacral foramina. Through these channels run the sacral nerves.

The laminae of the fifth sacral vertebra fail to fuse, and so form a gap at the lower end of the posterior wall of the sacral canal called the sacral hiatus. This hiatus is shaped like an inverted V and is bounded above by the fourth sacral vertebra, and laterally by the sacral cornua, which in reality are the inferior articular facets of the fifth sacral vertebra, and below by the first coccygeal vertebra. The The hiatus is covered by the tough, thin

and fibrous sacro-coccygeal membrane. Because of the oblique position of the sacrum, the hiatus looks almost directly upwards in a person standing erect.

In most individuals the dura mater extends downwards to the lower border of the second sacral vertebra, which point is from seven to nine cms. from the apex of the hiatus. At the foramen magnum the dura splits to form two layers, the inner forming the dura of the spinal cord, and the outer the periosteal lining of the spinal canal. Between those two layers is the epidural space, which contains fat, connective tissue and numerous thin-walled veins which form a rich plexus lying chiefly at the sides of the spinal cord. Strong bands of connective tissue pass from the anterior surface of the dura to the posterior longitudinal ligament. Below the termination of the dural sac, the sacral canal contains the filum terminale, ending at the first coccygeal vertebra, the sacral and coccygeal nerves, each enclosed in its prolongation of dura, as well as surrounded by fat, connective tissue and veins. Fluid placed in the sacral canal can therefore pass upwards outside the dural sac but within the spinal canal. The distance it rises is dependent amonst other things on the individual's position and the amount of fluid injected.

Although there are many variations and anomalies of the sacrum, those which concern us most are those which prevent the successful introduction of anaesthetic into the sacral canal. The chief of these is failure of laminae above the fifth sacral vertebra to unite, thus increasing the height of the sacral hiatus. This anomaly may involve any number of the sacral vertebrae, but commonly only the third and fourth. Testut, in a series of 285 sacra, found that 113 of them, or forty per cent, presented some degree of this anomaly. In a series of 31 sacra examined in Prof. J. C. B. Grant's department, 16, or fifty-one per cent of them showed some degree of the anomaly. In this same series there was a remarkable variation in the antero-posterior diameter of the canal—in some cases this diameter was hardly more than one to two mm. Another anomaly of the hiatus, fortunately rare in women of child-bearing age, is complete or partial ossification of the sacrococcygeal membrane. Hingson and Edwards found this occurred in one-half of one per cent of their cases. In many individuals the dural sac extends lower than the second sacral vertebra, and is not uncommonly found at the level of the fourth or fifth sacral vertebra, thus making a fatal intrathecal injection of anaesthetic a distinct possibility.

Physiology

The nerve supply to the human uterus and birth canal is exceedingly complex, and has not yet been properly determined. It can be summarized as follows:

Sensory

The pain of childbirth may be divided into two main types:

(1) The pain caused by contraction of the uterus. These pain stimuli are conducted to the 11th and 12th thoracic segments by nerve fibres passing through the pelvic, hypogastric and aortic plexuses, but functionally independent of the autonomic system.

(2) The pain caused by stretching of the cervix, vagina and perineum. The stimuli from the cervix and upper vagina are carried in the sacral parasympathetic nerves, also functionally independent of the autonomic system, and the stimuli from the lower vagina and perineum are carried in the perineal and pudendal somatic nerves.

Motor

The motor nerve supply of the uterus

is autonomic, involving both sympathetic and parasympathetic fibres, and is also divided into two types.

(1) to the fundus.

After leaving the cord at aproximately the sixth thoracic segment, the fibres reach the uterus after passing through the aortic, hypogastric and pelvic plexuses.

(2) to the lower uterine segment and cervix.

Some efferent fibres reach the uterus through the sacral parasympathetic nerves and are probably motor to the cervix and lower uterine segment and inhibitory to the rest of the uterus.

The great feature of caudal anaesthesia in obstetrics is that the pain of labour is abolished, whereas the contraction of the uterus is unimpaired. The question naturally arises at this stage as to how a local anaesthetic placed in the epidural space can bring this about. We know that local anaesthetics act by forming a chemical combination with the nerve protoplasm, and that sensory nerves, particularly pain fibres, are affected before motor nerves by reason of their thinner sheath. However, this does not fully explain the action of caudal anaesthesia, for in caudal anaesthesia the motor nerves to the perineum are paralyzed, as is evidenced by the relaxation of the perineum. Hingson and Edwards explain it by pointing out that the motor supply to the uterus arsies at least five segments higher than the sensory supply, and thus by careful regulation of the amount of anaesthetic injected only the sensory nerves to the uterus are affected.

They have had cases in which too much anaesthetic was injected, and the strength and frequency of the uterine contractions were impaired. They have injected dye into the epidural space of cadavers, and found that 30 cc.'s always ascended to somewhere between the 6th and 11th thoracic segments. But this experiment is considerably discounted when we consider the behaviour of a fluid placed in the epidural space during life.

We recall that in life this space is filled with areolar tissue and liquid fat, and that the space is a purely potential one. A fluid placed in this space must first of all compress the contents of the space, and then pass upwards in the space. The possibility of fluid injected into this space rising by physical means within a reason-space of time is very remote; in the chemistry department an experiment is performed every year in which concentrated copper sulphate solution is placed at the bottom of a graduate filled with water. During the space of a school year the copper sulphate fails to rise by *diffusion* more than one-third the height of the graduate. We must assume therefore that there is a dynamic process involved; and that the anaesthetic is absorbed by lymphatics in the sacral canal and passes upwards in the lymph stream. Within the epidural space the spinal nerves are covered with a thick layer of dura, and it is not until the nerves leave the intervertebral foramina that this protection is lost. It is likely that after epidural injection the local anaesthetic solution passes along the perineural lymphatics to leave the epidural space at the intervertebral foramina, and blocks the spinal nerves outside the spinal canal; producing in effect an extensive paravertebral block. This process of passing along the spinal canal and out the numerous intervertebral foramina is relatively slow, and therefore there is an appreciable lag between the time of injection and the time anaesthesia first appears. It is likely that by the time the anaesthetic solution reaches the 6th to the uterus originates), so much of it is absorbed by the blood stream that it does not affect the motor supply.

Another possibility is that during caudal anaesthesia both the sensory and motor nerves of the uterus are blocked, and that uterine contractions are maintained by hormonal activity. An animal uterus, isolated from its nerve supply, will continue to contract rhythmically, moreover pituitrin, which is a hormonal extract, produces vigorous increase in the strength of the contractions.

Selection of Drug

In selecting a suitable anaesthetic, we should keep in mind (1) the toxicity of the drug to both the mother and infant, and the rapidity with which it may be detoxicated in the body, (2) the concentration of the drug required to produce the desired analgesia in relation to its fatal dose, (3) the affinity of the drug for nerve protoplasm, or in other words the duration of its effects. Hingson and Edwards tested procain, metycaine pontocaine, nupercaine and eucupin with these qualifications in mind, and finally decided that 1½ per cent metycaine in isotonic saline best fitted the requirements. They also found that procain, pontocaine and monocaine in many instances closely approximated metycaine, but usually did not produce as much analgesia. Hingson and Edwards believe that the anaesthetic does not build up a fatal concentration in the fetal blood stream because it is detoxicated in the reticulo-endothelial system and liver of the mother, and in the placenta and does not reach the fetal blood stream.

The use of a local anaesthetic in the epidural space causes a slight fall in blood pressure due to general relaxation and loss of apprehension. This usually amounts to 5-10 mm. systolic pressure. In some cases this may amount to 80-100 mm. systolic pressure, and is usually prolonged. In such cases the fall in blood pressure is symptomless and the use of vasopressor substances is considered unnecessary.

In 13 per cent of his cases, Irving found evidence of fetal distress, as shown by a drop in fetal heart rate to 100 or less per minute. Seventy-five per cent (9 out of 12) of these cases occurred in patients having the prolonged drop in blood pressure. He has determined that in all probability the fetal distress is caused by fetal anoxemia, which in turn is due to the low maternal blood pressure, producing a bloodless uterus. The condition is relieved when the mother is given oxygen. The ischemic uterus is probably due to the drop in blood pressure and the increased contractility of that organ. This work has not been confirmed.

Technique

With the patient in the knee chest or knee elbow position (some workers prefer the modified left lateral Syms position) the sacral area is scrubbed and draped as for a major operation. The tip of the coccyx is palpated from above with the middle finger of the left hand, and the thumb is used to find the hiatus, which is from 1½ to 2 inches from the tip of coccyx in most individuals. The thumb of the left hand changes places with the middle finger which is used as a guide to the hiatus. A skin wheal is raised over the hiatus with a 25 gauge needle. A 22 gauge 2-inch needle is pushed through the skin wheal, and the subcutaneous structures and the sacro-coccygeal membrane are anaesthetized. This needle is withdrawn and a 19 gauge malleable silver needle, especially made for continuous caudal anaesthesia, is introduced through the wheal and the sacro-coccygeal membrane at an angle of 45° to the skin. As soon as the needle pierces the membrane, its hub is depressed for half to one inch and the needle advanced up the sacral canal

from 1 to 3 inches, attempting to keep the needle as close to the roof of the canal as possible. The tip of the needle should not be higher than the 2nd sacral vertebra. This can be measured on the skin surface by means of the stylet. Great care is taken to make sure that the tip of the needle has not entered a blood vessel or the dural sac. If on removing the stylet blood appears, the needle is withdrawn half a centimetre. All workers consider the appearance of C.S.F. a definite contra-indication to caudal anaesthesia, and discontinue the operation. If no blood or C.S.F. appears, the needle is gently aspirated with a syringe. Lundy warns against forcible aspiration, because of the possibility of soft tissues being sucked into the lumen of the needle and thereby falsifying the results. Using a 10 cc. syringe, 8 cc. of anaesthetic are injected, aspiration being performed at least once during the injection. This is a final precaution against intrathecal injection. If after 10 minutes no signs of spinal anaesthesia are present, four feet of hard rubber tube is attached to the hub of the needle. To the other end of the tube is attached a special syringe which, by means of a two-way valve in its tip, enables the withdrawal of anaesthetic fluid from a container and its injection into the sacral canal without removing the syringe from the apparatus. Precautions are taken to make sure the tube is free from air bubbles. A total of 30 cc. of anaesthetic is now injected. Analgesia is maintained by an injection of 20 cc.'s every thirty to forty minutes

Two variations of this technique will be described:

(1) Lundy, after preparing the patient and anaesthetizing the skin and deeper structures in the usual manner, inserts a 13-gauge Love-Barker needle into the sacral canal. A no. 5 uretral catheter is inserted through the Love-Barker needle and on up into the sacral canal to the level of the 2nd or 3rd sacral vertebra. The Love-Barker needle is then withdrawn over the catheter. After the usual aspiration tests have been satisfactorily performed, a hard rubber tubing is attached to the catheter, and the apparatus is strapped in position. The patient is turned on her back and the tubing is brought out around the flank. To the end of the tubing the two-way syringe is attached; and the anaesthetic is administered in the usual manner.

(2) The other method is that of Block and Rochberg, who administer the drug by continuous drip, analogous to that used in the administration of intravenous fluids. After the usual preliminary steps, a 17-gauge spinal needle is inserted for 2½ to 3 inches into the sacral canal. When the aspiration tests are completed, the rubber tubing is attached to the needle and the apparatus is strapped in position. The patient is turned on her back and the other end of the tubing is attached to a 250 cc. cylinder containing one per cent procaine, and so placed that it is four feet above the bed and seven and a half feet above the floor. The anaesthetic is allowed to flow into the tubing at a rate of 15 to 20 drops a minute, precautions being taken to make sure the tubing is free from air bubbles.

Signs of Caudal Anaesthesia

(1) Loss of sensation appears first within five minutes over the coccyx and then spreads over the perineum, gluteal region, and down the legs to the feet. Anaesthesia also appears on the anterior abdominal wall, and in good technique this should not be allowed to ascend higher than the level of the umbilicus.

(2) The legs are flushed, warm and dry. This is due to block of the sympa-

thetic supply to the legs. It may at first be unilateral, but this may be corrected by rotating the needle towards the non-anaesthetized side. There is no motor paralysis of the lower limbs. This is the differentiating point from spinal anaesthesia, for in spinal anaesthesia the patient cannot move her legs.

(3) There is striking relaxation of the perineum; the anus is gaping and toneless, so that three fingers may be admitted with ease.

(4) The bladder is distended and relaxed. There is no desire to micturate.

(5) The cervix dilates rapidly. Throughout the period of anaesthesia uterine contractions proceed undiminished.

Comparison of the Methods

I. *Uretral catheter method*

Advantages:

(1) Greater freedom of movement without displacing the catheter.
(2) Less danger of perforation of the dura or blood vessel.
(3) No danger of a broken needle.

Disadvantages:

(1) It is more traumatizing, and therefore there is greater risk of infection.
(2) The number of failures is increased because of greater difficulty in inserting the larger needle.

II. *Malleable needle technique*

Advantages:

The smaller needle is less traumatizing and the danger of infection is minimized.

Disadvantages:

(1) Perforation of the dura after the needle is in place.
(2) Broken needle.
(3) Possible trauma within the canal on account of the patient moving.
(4) Contamination of the exposed plunger of the syringe, especially during prolonged labours.

III. *Continuous drip method*

This differs from the malleable needle technique only in the fact that the danger of contamination from the syringe is non-existent.

Development of a smaller catheter so that a 16 gauge needle can be used, and the use of the drip method to administer the anaesthetic solution, should combine all the advantages of the foregoing techniques

Conduct of Labour with Continuous Caudal Anaesthesia

Stage I.

No pre-anaesthetic sedation is considered necessary. The patient is catheterized and given an enema. The anaesthetic is started only when the head is engaged, when the pains are occurring at 5 minute intervals or less, and when the cervix is at least two fingers dilated. Occasionally as the anaesthetic is started, the mother experiences a feeling of fulness with tingling of the lower extremities and a sense of nausea and dizziness. These symptoms are taken to mean that the anaesthetic is being administered too rapidly, for they disappear when the speed of administration is cut down. The cervix dilates rapidly, although apparently not rapidly enough for some workers, who practice manual dilatation. The perineal structures are remarkably relaxed, and the mother shows no signs of the drawn and fatigued appearance so commonly seen. Indeed many mothers fall asleep, and some workers have even fed patients during the course of labour. On the whole the first stage is shortened as compared to other methods of anaesthesia on account of the rapid dilatation and effacement of the cervix and the relaxation of the perineal structures.

Stage II.

In continuous caudal anaesthesia there is no second stage as it is commonly understood, because the usual bearing down reflex has disappeared due to the loss of pressure sense in the rectum. The patient has to be coached to bear down, and for this reason the second stage is somewhat longer than usual. However, there is the marked advantage that the obstetrician can tell the patient when to bear down, thereby avoiding precipitate delivery and minimizing lacerations. There is an increase in the number of operative deliveries, because the mother lacks the voluntary expulsive power of her accessory muscles. The incidence of occiput posteriors is also increased. This is because the relaxed pelvic floor offers so little resistance to the advancing head.

The infant in nearly every case cries vigorously as soon as the head is born, and care must be taken to prevent the aspiration of mucous as the nose crosses the perineum.

Stage III.

After delivery of the baby, the uterus maintains its tone and bleeding is lessened. The use of oxytocic drugs before the placenta is born is considered unnecessary, as the uterine contractions proceed unchanged. During this stage the repair of episiomoty wounds can be carried out without any local infiltration. Pituitrin is usually given immediately after the placenta comes away.

Summary

The historical background of caudal anaesthesia has been presented; and the anatomical and physiological basis of continuous caudal anaesthesia has been discussed. A brief account of the techniques of application is followed by a description of the course of a normal labour using this method.

Part II

G. L. SNIDER, 4T4

COMPLICATIONS

Subdural Injection

Intrathecal injection, giving rise to massive spinal anaesthesia with rapid extensive fall in blood pressure and respiratory paralysis, is the most serious and dangerous of the complications following caudal anaesthesia. There have been no deaths from this cause, since the inception of continuous caudal anaesthesia; however, such deaths have been not infrequent in the large series of single caudal injections which have been published. There have been several cases reported of spinal anaesthesia occurring during continuous caudal anaesthesia. None occurred in the present series.

Prevention is the best treatment for this complication. This has been discussed in Part I of the paper. I wish, however, to emphasize again the importance of the test dose, because it is possible to have perforation of the dura without aspiration of cerebrospinal fluid occurring. If massive spinal anaesthesia occurs, the following treatment should be carried out at once: drop in blood pressure and shock are treated in the usual manner with epinephrine, ephedrine, stimulants and intravenous fluids such as plasma. Respiratory paralysis must be treated by artificial respiration; this may require intubation.

Massive spinal anaesthesia has been an uncommon complication of caudal anaesthesia, but when it has occurred, the presence of an anaesthetist skilled in the

art of intubation and resuscitation has proved life-saving.

Infection

Infection at the site of injection may occur either in the soft tissues superficial to the sacrum, causing an episacral cellulitis or abscess, or it may occur in the sacral canal, giving rise to an epidural abscess.

The incidence of infection in their series of 10,000 cases is reported by Edwards and Hingson as 0.85 per cent, of which 0.05 per cent are epidural infections. One fatality has been reported. (In this case epidural abscess developed with which there were no localizing signs or neurological manifestations. The patient was treated with sulphonamides but died on the 31st post-partum day. Post mortem examination revealed multiple small pulmonary abscesses and a large abscess involving the peridural space and communicating through the foramina with a sub-psoas abscess. The infection had not penetrated the meninges.)

The principal etiologic factor in infection is faulty technique; this includes

(1) Contamination from the skin through which the injection is made.

(2) Contamination of the injected solution:

(a) which is not sterile to begin with;

(b) which is contaminated during administration.

(3) Trauma over the site of injection.

Since the site of injection is so close to the anus the regional skin should be rigorously cleansed, antiseptics applied, and the area draped as for any surgical operation. Extreme care should be taken in the sterilization of the apparatus and in the preparation of the solution. In the closed circuit technique the only bacteriologic weak point is the plunger of the all-glass syringe, which may easily become contaminated. A Record syringe obviates this danger. The difference in tissue trauma occurring during the needle and catheter techniques has already been discussed. I wish merely to add that multiple punctures in either method increase trauma and greatly increase the hazards of infection. More than three attempts at insertion should not be made in any one case.

Clinically, it is difficult to diagnose epidural abscess complicating continuous caudal anaesthesia. It should be suspected in all cases in which there is unexplained fever, leukocytosis and malaise lasting several days. There may be low back pain, exaggerated by coughing, sneezing, jugular compression or movement. There may be tenderness over the sacrum. Radicular pains at the site of the abscess are common and there may be hyperesthesia or numbness in the dermatones supplied by the roots involved. Treatment measures include: aspiration of pus, local injection of penicillin or sulphonamides, surgical drainage through one of the posterior sacral foramina, and systemic measures. Episacral abscess is similar to superficial infection elsewhere and it is treated by drainage and sulphonamide therapy.

Toxic Reactions

Toxic reactions to the anaesthetic drug can be due to three factors:

(1) Rapid absorption.

(2) Intravenous injection.

(3) Idiosyncrasy.

(1) *Rapid Absorption*

The epidural space is very vascular and in certain patients the drug may be absorbed more rapidly than it can be safely metabolized and a reaction thus precipi-

tated. It has been suggested that the addition of epinephrine to the anaesthetic solution in a low concentration (1 :200,000) will slow the rate of absorption, by causing constriction of arterioles. This is borne out by the clinical observation that the time between supplementary injections is greatly increased when this is done. An objection to its use is that, pharmacologically, adrenalin is an inhibitor of the pregnant animal uterus; it is questionable whether this is true for man in the concentrations of adrenalin used.

(2) *Intravenous Injection*

This is another complication which cannot always be avoided. A case has been reported in which blood was not obtained on preliminary aspiration and 25 cc. of 1.5 per cent metycaine were injected ten minutes after a test dose of 8 cc. The patient became irrational, talked incoherently, and underwent mild clonic convulsions of the extremities. The reaction lasted two minutes, disappearing before treatment could be instituted. The fluid was believed to have gone intravenously because (*a*) the needle and about a foot of the pressure tubing were filled with blood, (*b*) no anaesthesia developed, (*c*) the needle was reinserted and anaesthesia carried out without reaction for the remainder of the labour. A similar clinical picture has been described in other series but without such conclusive evidence of intravenous injection.

The treatment of this condition is, of course, primarily prophylactic. When a reaction does occur the intravenous injection of one of the quick-acting barbiturates such as sodium pentothal will promptly stop the convulsions. Artificial respiration should be given if necessary. Since the administration of a barbiturate increases fourfold the dose necessary to kill an animal, it has been suggested that a barbiturate is indicated as pre-anaesthetic medication.

(3) *Idiosyncrasy*

Sensitivity to locally employed anaesthetic drugs may occur, the most dangerous being that manifested by the anaphylactic reaction. Every patient should be questioned as to a history of allergy or reaction to previous use of the drugs, as in dentistry. If reaction does occur, management is the same as for any other anaphylactic reaction, namely, immediate injection of epinephrine hydrochloride.

Dermatitis, in the form of erythema multiforme which cleared up spontaneously in two days, has been reported.

Broken Needles

This has been a fairly frequent complication in the earlier reports, using the needle method, but with the development of the malleable needle and the catheter technique the incidence has fallen. This danger can be minimized by not using a needle more than five times, keeping the patient on her side, and not turning her on her back till after the needle has been removed just before delivery. When a needle breaks it should be removed at once lest it migrate farther into the sacral canal and become inaccessible. In one case the needle could not be removed from the sacral canal even after prolonged exploration. Another author has reported a case in which the needle was removed from the fourth lumbar vertebra at post mortem six months after the accident.

Injury of Nerve Roots

This appears to be a very rare complication. R. J. Hawkins has reported a case with motor and sensory changes occurring over the distribution of S4 and S5 on one side following continuous caudal anaesthesia. Further observation is necessary to elucidate this point.

Changes in Blood Pressure

Fall in blood pressure may be symptomless or may be associated with a feeling of faintness, fatigue and sweating. The face is pale and the pulse weak. Increased respiratory excursion may indicate mild air hunger. All the larger changes in blood pressure occur in patients in whom the level of anaesthesia is at or above the umbilicus. Shock reactions in which the blood pressure falls to 0 are not uncommon and have been reported in an incidence of roughly one per cent in all the larger series. They have all responded readily to the administration of pressor substances. Some workers add epinephrine to the solution in an attempt to control falls in blood pressure, but it would appear that keeping the anaesthesia below the level of the umbilicus is more important. In cases where anaesthesia is purposely pushed to a higher level, as for Caesarian section, parenteral ephedrine sulphate as premedication appears to control fall in blood pressure.

Antesacral Injections

Because of the variation in form of the sacrum, and of the angle between coccyx and sacrum, it is possible in difficult cases to penetrate the sacro-coccygeal joint or the tissue lateral to it so that the point of the needle will come to rest on the anterior surface of the sacrum or close to the rectum. This is commonest in those cases in which the sacral hiatus is difficult to identify. Since the rectum may be flattened against the sacrum by the fetal head, penetration of the rectum and vagina is not difficult. In one such case, penetration of the parietal bone of the infant was prevented only because the needle was malleable. A case is reported, too, in which a fatal injection of metycaine was made with a stiff needle into the cranial vault of a baby.

Fetal Mortality

One of the most striking observations in patients delivered under continuous caudal anaesthesia is the manner in which infants cry almost as soon as the head is born. However, I have seen reported in the literature three cases of fetal death attributed to continuous caudal anaesthesia.

Maternal Death as a Complication of Continuous Caudal Anaesthesia

Since the introduction of continuous caudal anaesthesia there have been but two deaths in obstetrical patients reported in the literature. One of these was a case of pulmonary embolism in which the source of embolism was the thrombosed veins in the epidural space. The other resulted from infection and has been discussed. With the precautions that have been developed, the risks of death due to continuous caudal anaesthesia are minimal. Whether the risk is less than with inhalation anaesthesia is an extremely dfficult queston to answer; time alone will tell.

Do Nerves Become Refractory to Local Anaesthetic Drugs?

The difficulty so frequently experienced in maintaining the effect of the anaesthesia over a long period of time, is suggestive of the possibiltiy of the nerve roots becoming refractory to the action of the drug after prolonged anaesthesia. The only animal experiments on this subject have been with the rabbit cornea and no conclusions regarding the present problem can be drawn from them.

Other Complications

Backache

Low back pain, occurring after anaesthesia has worn off, and of sufficient severity to require morphine, has been

quite frequently reported. Hingson and Edwards believe that relaxation of the lower lumbar muscles produces too rapid an obliteration of the lumbar curve, which during the latter months of gestation has become exaggerated as the strut of pregnancy. They have their patients spend all of the labour time on one or other side. However, unless there is frequent turning from one side to the other, this leads to unilateral anaesthesia. For this reason, Block and Rotstein allow their patients to lie on their backs and use morphine sulphate to control the pain.

Headache

Headache, when it occurs, is transient in duration and occurs in those patients in whom the anaesthetic is being injected too rapidly or in too large quantity. Pain in the spine radiating up to the neck has also been ascribed to the same cause. There is one such case in the present series.

Nausea and Vomiting

This occurs in a small number of cases but it is never severe and does not last long. Since nausea and vomiting occur quite frequently with other anaesthetics and even in labour without any sedation, only a small portion of these can be ascribed to the toxic action of the drug. That this toxic action does exist, however, is suggested by the fact that in some of the cases in which nausea and vomiting occurred, it has followed successive injections of anaesthetic solution.

Advantages of Continuous Caudal Anasthesia

A.—*Continuous Caudal Anaesthesia in Premature Labour*

It is generally agreed that it is advantageous to the infant to use continuous caudal anaesthesia in premature labour.

(1) Since the mother has had no sedative or anaesthetic which will pass the placental barrier and narcotize the infant, respiration is almost invariably established spontaneously immediately after delivery.

(2) Because of the relaxation of lower uterine segment, pelvic floor and outlet, and because the convulsive voluntary expulsive efforts of the mother are not suddenly brought to bear on the infant, trauma to the infant's head is considerably reduced. Delivery is usually spontaneous and when it is not, operative procedures are easy.

Edwards and Hingson believe also that: (1) The mothers are alert and cheerful and are therefore not secreting various harmful hormones (e.g. epinephrine) as they do in pain and fear. (2) The mothers keep up fluid intake and nutrition and therefore blood sugar level and fluid balances approach normal. This minimizes the extra hazards of hypoglycaemia and dehydration. (3) A minimum of blood loss and systemic shock to the mother favours prompt formation of maternal milk which is vital to the premature baby.

In my opinion their hypotheses are interesting but are as yet in the realm of speculation

B.—*Continuous Caudal Anaesthesia in Eclampsia*

The use of continuous caudal anaesthesia with noteworthy results in several cases of eclampsia and pre-eclampsia has been reported. The systolic and diastolic blood pressures in these cases fell from very high levels to below 150/90 and remained below this level after anaesthesia had worn off. Headaches, dizzy spells, coma and irrationality disappeared, not to return. There was an increase in the urinary output with a reduction in the

concentration of urine. Convulsions were controlled without resort to other forms of sedation. All patients were delivered of live infants and there was no maternal mortality or unusual post-partum morbidity.

If this work is confirmed in a larger series of cases it may throw further light on the etiology of eclamptic toxaemia.

C.—*Continuous Caudal Anaesthesia in Cardiac Disease*

The physiological phenomena which add to the burden of the diseased heart during labour include (1) the emotional strain on the patient, especially that of fear and reaction to pain, (2) the muscular effort of bearing down.

The stress of labour may so tax the reserve of the heart that a general anaesthetic is contraindicated because of the impaired aeration which necessarily occurs.

Under continuous caudal anaesthesia the patient is at ease, has relief of pain and hence emotional reaction is reduced. Bearing down movements are abolished. and uterine contractions alone will expel the presenting part into the vagina and usually cause descent to the point of perineal bulging. Delivery may then be easilly accomplished by operative means. It would thus appear that successful continuous caudal anaesthesia minimizes the stress on the diseased circulatory systen

Contraindications

(1) Infection over the site of injection.
  - (*a*) Pyogenic skin infection.
  - (*b*) Infected pilonidal cyst.
  - (*c*) Fungus infection.

(2) Anatomic anomalies.
  - (*a*) Bony obliteration of the sacral hiatus.
  - (*b*) A low lying dura in which spinal fluid may be aspirated through the caudal needle.
  - (*c*) gross deformities of the spinal column as scoliosis or exaggerated lordosis.
  - (*d*) Extremely obese patients in whom the sacral hiatus is not easily palpated.

(3) Patients with a history of sensitivity to local anaesthetic drugs.

(4) Neurological contraindications.
  - (*a*) Psychically unsuited patients.
  - (*b*) Epiliptiform seizures.
  - (*c*) Central nervous system disease.
  - (*d*) Patients who have had meningitis or encephalitis.

Particularly apprehensive patients or neurotics are unsuitable because actually at no time is relief of pain complete. Such patients will not lie still during labour, and inhalation anaesthesia is usually necessary at delivery.

(5) Placenta praevia.

Since the lower uterine segment becomes relaxed the possibility of haemorrhage is greatly increased.

(6) Cephalo-pelvic disproportion.

Statistical Analysis of the Toronto Cases

This series of cases was gathered from the files of the Burnside Division of Toronto General Hospital, The Alexandra Wing of the Toronto Western Hospital, the Women's College Hospital, and from the files of Dr. J. S. Chaikoff, Toronto. The needle technique has been used in most cases, the catheter technique in a few.

There are 78 cases, whch were delivered from March to November, 1943.

I have arbitrarily defined a successful case as that in which continuous caudal anaesthesia was able to give satisfactory relief of pain during labour, and under which delivery was possible without inhalation anaesthesia to a surgical plane.

53, or 67.8%, were successful; 4 of these required light inhalation anaesthesia because of apprehension.

25, or 32.2%, were failures.

Of the 25 failures, 10 were complete failures; that is, at no time was there any relief from pain. There were as many as six attempts to establish caudal anaesthesia in several of these cases. Four of the 25 were multipatras in whom there was insufficient time to establish anaesthesia before delivery occurred; 11 of the 25 were partially successful, that is, there was relief from the pains of labour lasting from a few minutes to 12 hours. Anaesthesia was discontinued in this group of cases for the following reasons:

6 due to displacement of the needle and the inability to re-establish anaesthesia.

2 due to broken needles.

1 due to false labour.

1 due to failure to progress after 22½ hours of satisfactory anaesthesia.

1 due to irregularity of fetal heart.

Thus we see that at least 14 of the 25 failures might have been prevented by improved technique, or more careful selection of cases.

Table I is a comparison of the results of some of the American workers with those of the Toronto workers. The wide differences between the results of Siever and Mousel and the others is difficult to explain. The Toronto series is as yet quite small; 5 different operators working independently have administered the anaesthetics. I believe that as the experience of the Toronto anaesthetists increases their results will approximate those of the experienced American workers.

TABLE I—SUCCESS OF THE TECHNIQUE

Series	Number of Cases	Successful	Partially Successful	Complete Failure	Total Failures
Toronto	78	67.8%	14.1%	17.1%	32.2%
Edwards and Hingson[1a]	11,150‡	80.5%	12.1%	7.4%	19.5%
Parrett[8]	160	80.6%	12.5%	6.9%	19.4%
Gready[2]	121	84.0%	*....	*....	16.0%
Siever and Mousel	300	95.8%	†....	†....	4.2%

*Analysis of failures not given.
†Failures defined as cases requiring supplementary anaesthesia—no further analysis given.
‡This includes 1,150 cases of Edwards and Hingson and 10,000 cases gathered from 68 American clinics at which the operators had been trained by Edwards and Hingson. The figures were identical in both series.

Of the 53 successful cases, 33 or 62.1% were primiparous women, 20 or 37.9% were multiparous. The preponderance of primiparas bears out what has been found elsewhere; that continuous caudal anaesthesia is of more value in primiparas than in multiparas because the progress of labour is often too rapid in the latter to warrant the time and effort of inducing the anaesthesia .

The general concensus of opinion

among the American workers has been that the percentage of operative deliveries is increased. Parrett reports an increase from 19.6% with inhalation anaesthesia to 36.2% with caudal. Irving and his group of workers report an increase from 74.5% to 84.6% of which prophylactic forceps made up 57.3% and 58.7% respectively accounting for only 1.4% of the difference. In the Toronto series 57.6% of the patients required operative delivery (not including episiotomy alone). In primiparas the operative rate was 75.5%; in multiparas the operative rate was 30.0%.

sixth rotated posteriorly and was born face to pubis. There was 1 breech (1.9%), a premature born spontaneously.

Table II shows the duration of caudal anaesthesia in the present series, for the successful cases in which figures were available. The reported figures in two of the American series are also given. The longest period of continuous caudal anaesthesia in our series was 22 hours and 28 minutes in a case which was discontinued because of lack of progress of labour.

The average dose of metycaine used in 68 cases was 2.3 gms., the range being from 0.2 gms. to 9.0 gms. Edwards and

TABLE II—CAUDAL TIME IN HOURS AND MINUTES

Series	Total Series			Primiparas Alone		Miltiparas Alone	
	Number of Cases	Range	Average	Range	Mean	Range	Mean
Toronto.....	52	1:00-18:55	4:55	1:15-18:55	5:19	1:00-14:05	4:14
Edwards and Hingson[1a]....	1,050	:35-33:0	5:10		6:30		2:20
Siever and Mousel.....	200	:30-24:30	8:20				

There is an increase in the number of posterior positions of the occiput with continuous caudal anaesthesia believed to result from a decrease in the number of spontaneous rotations. Siever and Mousel report an incidence of 10% with caudal as opposed to 4% with inhalation anaesthesia. Parrett reports failure to rotate in 9.4% as opposed to 4% with inhalation anaesthesia. Of the 53 successful cases in the present series there were 45 occiput anterior or 86.6%, 1 occiput transverse or 1.9% which required manual rotation and forceps delivery; and 6 occiput posteriors or 11.5%, 5 of which or 83% required manual rotation and forceps delivery. The Hingson report a maximum of 11 gms. used.

FETAL COMPLICATIONS

I have no information on neonatal mortality.

There were 3 still births, or 3.9%. All of these were premature infants in which death was intrapartum; in two cases the cord was looped tightly about the neck of the fetus and in one it was twisted on itself so as to occlude the vessels. In the latter, post-mortem showed no other cause for death; the mother of this infant had pre-eclampsia. The third was a premature breech. There is no evidence implicating

the anaesthesia as the cause of death in any of these cases.

Forty-seven of the 53 infants in the successful cases cried spontaneously. Two of the 6 that did not cry spontaneously were still births. Four were hard forceps deliveries. Of the 4 prematures in the series, 2 were still births and 2 cried spontaneously.

Complications of Caudal Anaesthesia

There were no maternal deaths in this series. Two broken needles, both of which were easily removed and not followed by other complications, have already been mentioned.

There was retained placenta requiring manual removal under general anaesthetic in three cases, and retained membranes in one case. There was one case of post-partum haemorrhage in a successful case.

There were two cases of episacral abscess. In one of these, which was discovered several days post-partum, streptococcus faecalis was cultured. The other occurred following six attempts to re-induce caudal anaesthesia after the needle had been displaced during an operative procedure. From the second day post-partum the patient ran a fever ranging from 99 to 102 degrees F. and had a W.B.C. of 18,000. Urine and lochia were negative. The patient continued to run a fever but it was not until five weeks post-partum that a bead of pus was seen exuding from the site of injection. On exploration, an abscess filled with pus and necrotic tissue extended over the sacrum into the left lumbar region. Pus produced no growth on routine culture. The organism may have been anaerobic or, as has been suggested by the anaesthetist in this case, metycaine leaking through holes punched in the sacro-coccygeal ligament may have given rise to a necrotizing lesion. The latter explanation seems unlikely to me since extensive subcutaneous injection has occurred twice in this series (125 cc. and 158 cc.) and has been reported numerous times in the literature, and no untoward effect has followed. In both cases the abscess was surgically drained, sulphonamides were used locally and systemically, and recovery was uneventful. There have been no epidural infections in this series.

Reactions occurring were as follows (descriptions are for the most part quoted from the records):

One patient became semi-conscious during delivery and recovered without any untoward symptoms ten minutes after delivery. One patient felt faint and complained of shortness of breath and air hunger four hours after the anaesthetic was begun. She felt tingling in her arms. On examination, her pulse was fast, thready, and hard to get. This, however, did not last for more than ten minutes; at the end of the ten minutes the patient was found to be anaesthetic to the level of the nipples. Accompanying the tingling of the arms which she complained of, was numbness, and she was unable to move her legs. This reaction is probably due to the level of anaesthetic rising too high. In another case blood was aspirated ten minutes before the test dose of 8 cc. was given. Following this, the patient became dizzy and sweating occurred. The remainder of anaesthesia was uneventful.

One patient felt hot and a pain lasting one minute radiated up the spine to her neck. This occurred twice consecutively when 20 cc. doses were supplemented. It did not occur when the size of the dose was reduced.

Nausea and vomiting occurred in nine cases. Pain in the back, after anaesthesia had worn off, occurred in several cases, and required morphine in at least one case.

Blood pressure was recorded in 33 cases.

In eight, or 21% of these there was a fall of 20 mm. or more in the systolic pressure. The greatest fall was 60 mm., and three required pressor substances to increase blood pressure.

Other reactions included dizziness for a few minutes after induction, and chills lasting five minutes during the course of anaesthesia.

Summary and Conclusions

(1) The patient can be made comfortable during labour and delivered without deep inhalation anaesthesia in approximately 80% of cases.

(2) The infant is completely free of narcosis at birth and will cry spontaneously in most cases.

(3) The procedure is relatively simple and adequately safe for those skilled in its use. The procedure is dangerous in the hands of the untrained individual.

(4) The patient in labour is calm, relaxed, rational, and co-operative. Subjective pain as an aid to following labour is lost. Stage I is shortened because the patient has no desire to bear down. Operative deliveries are increased and spontaneous rotation of occiput posteriors reduced.

(5) It is a lengthy, time-consuming procedure; for a skilled anaesthetist must always be in attendance, especially if resuscitation becomes necessary following a shock reaction.

(6) The possibility of a fatal intrathecal or intravenous injection is always present, despite the most careful precautions.

(7) Certain operative manoeuvres are more difficult to carry out because the uterus is not completely relaxed. Others are easier, because of the relaxation of the lower uterine segment and pelvic outlet.

(8) The procedure is restricted to hospital use because of the specialized care necessary.

(9) The method is not applicable to all parturients; there are definite contraindications.

(10) It is too soon to answer the question of whether continuous caudal anaesthesia will become a safe and satisfactory routine procedure in selected cases. However, in my opinion it is a very useful addition to the armamentarium of the obstetrician in the treatment of premature labour, and parturients with cardiac disease. It may possibly add to our knowledge of the treatment and etiology of eclamptic toxaemia.

I wish to thank Dr. J. S. Chaikoff, Senior Anaesthetist at the Mount Sinai Hospital, Toronto; Dr. J. Ross, Resident Obstetrician, Burnside Obstetrical Hospital; and Dr. E. C. Blatchford, Anaesthetist in Chief at the Women's College Hospital, for their assistance in the collection and interpretation of the data.

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SHOULD VITAMIN D BE GIVEN ONLY TO INFANTS?

Vitamin D has been so successful in preventing rickets during infancy that there has been little emphasis on continuing its use after the second year.

But now a careful histologic study has been made which reveals a startling high incidence of rickets in children 2 to 14 years old. Follis, Jackson, Eliot, and Parks* report that postmortem examination of 230 children of this age group showed the total prevalence of rickets to be 46.5%.

Rachitic changes were present as late as the fourteenth year, and the incidence was higher among children dying from acute disease than in those dying of chronic disease.

The authors conclude, "We doubt if slight degrees of rickets, such as we found in many of our children, interfere with health and development, but our studies as a whole afford reason to prolong administration of vitamin D to the age limit of our study, the fourteenth year, and especially indicate the necessity to suspect and to take the necessary measures to guard against rickets in sick children."

*R. H. Follis, D. Jackson, M. M. Eliot, and E. A. Park: Prevalence of rickets in children between two and fourteen years of age, Am. J. Dis. Child. 66:11, July 1943.

Abstracts

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MEDICINE

Penicillin in the Treatment of Infections: A Report of 500 Cases. Statement by the Committee on Chemotherapeutic and Other Agents, Division of Medical Sciences, National Research Council, U.S.A.

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J.A.M.A., Vol. 122:1217-1224, Aug., 1943

This is a report of 500 cases treated with penicillin by 22 investigators. It is concerned chiefly with giving the over-all results in the various groups of cases.

Mode of Administration

Solutions of penicillin were given (1) intramuscularly, (2) intravenously, both by continuous drip and by single injections repeated at 2-, 3-, or 4-hour intervals, and (3) topically by injection into the subarachnoid space or pleural cavity or applied locally to the skin.

Concentration and Volume of Penicillin

For intravenous use 1000 Oxford units per cc. or less were used. The rate of injection varied from 120,000 to 240,000 units every 24 hours, administered in 75-100 cc. of normal saline or 5% glucose. For intramuscular injection a solution of 5000 units per cc. is used in order to keep the volume of fluid injected low and thus avoid local discomfort.

Dosage

Dosage schedule varied from 1,000-25,000 units per hour depending on the kind and severity of infection. The question of adequate and optimum dosage has not been clearly defined. The objective in treatment should be the maintenance of a sufficient concentration of penicillin in blood to inhibit completely the growth of the organism. Various methods of titrating penicillin in the blood serum and body fluids have been used in order to determine the amount of drug necessary to reach the above objective. Such laboratory methods of determining dosage should be used when available.

Other methods of assessing adequate dosage are the signs of clinical response. These must be followed with great care and should include: changes in temperature, pulse rate, constitutional symptoms, results of blood culture and the effect on the local infection.

Absorption, Excretion and Distribution

Intravenous injections of penicillin results in a high initial concentration in blood plasma, followed by an abrupt fall due to urinary excretion. Penicillin is rapidly absorbed after intramuscular injection and is rapidly excreted in the urine. Absorption after subcutaneous injection is very slow. There is little absorption of penicillin after oral or rectal administration due to inactivation by gastric juice and *E. Coli.*

In the presence of renal failure penicillin is not excreted rapidly and as a result high concentrations are maintained in the blood stream after intravenous injection. In addition to excretion in the urine, penicillin is excreted by the liver in the bile.

Studies on the distribution have shown that penicillin injected intravenously does not appear in significant amounts in spinal fluid, saliva or tears.

Intrathecal Injection

In normal subjects, 5,000-10,000 units of penicillin injected intrathecally is slowly absorbed and slowly excreted in the urine. There is some evidence that penicillin is slightly irritating to the normal meninges and the injection of 10,000 U. may be followed by headache, vomiting, increased intrathecal pressure and pleocytosis in the spinal fluid. Smaller amounts cause less intense symptoms. In patients with meningitis, absorption of penicillin from the subarachnoid space is more rapid than in the normal, and urinary excretion is correspondingly increased.

Penicillin Resistant Strains

It has been shown that strains of staphylococci, pneumococci and haemolytic streptococci may be made resistant to penicillin by exposing them over long periods of time both *in vivo* and *in vitro*, to the drug. However, unlike sulphonamide-fast strains, these organisms decrease in virulence. Penicillin-fast strains are susceptible to sulphonamides and the opposite also holds true.

Results of Treatment

I.—Staphylococcus Aureus Infections With Bacteremia.

Sixty per cent of 91 patients with Staph. Aureus bacteremia recovered, or improved so that recovery occurred at a later date. Without penicillin or sulphonamides the fatality rate is 85%. Since the fatal cases included 9 cases of Acute Ulcerative Endocarditis and many of the fatalities received an inadequate dosage and began treatment late in the course of the disease, the authors consider these results impressive.

II.—Staphylococcus Aureus Infections Without Bacteremia.

(*a*) Osteomyelitis.

Of 55 cases treated, 7 showed no effect and 48 recovered or improved; that is, sinuses healed, or the exudate was sterilized and wounds were healing.

Following penicillin treatment, the exudate decreases greatly in amount within a few days and organisms are quickly reduced in number. Healing progresses rapidly and sinuses that have been present for months or years heal in two to three weeks. Some cases break down after treatment is stopped. It is too early as yet to assess long term results.

(*b*) Empyema.

Empyema cavities may be sterilized in a remarkable fashion by the repeated local injections of penicillin. Chronic cases may require surgical procedures to effect obliterations of the empyema cavity.

(*c*) Burns and Infections of the Skin.

Impressive results have been obtained in the treatment of severe skin infections. Early and intensive treatment, locally and systemically, is desirable.

III.—Streptococcal Infections Other than Bacterial Endocarditis.

Thirty-three cases of sulphonamide-resistant streptococcal infections were treated.

(*a*) Haemolytic Streptococci.

23 cases were treated. 13 recovered or were greatly improved. 7 died and 3 showed no effect.

(*b*) Anaerobic Streptococci.

4 of the 6 patients recovered. 5 of the 6 infections were puerperal endometritis; only 1 of these died.

(*c*) Non-Haemolytic Streptococci.

3 of 3 patients treated died.

IV.—Pneumococcic Infection.

Penicillin is very patent against pneumococcal infections such as pneumonia which are resistant to sulphonamides. Results in the treatment of pneumococcal endocarditis were disappointing. There were 7 recoveries in 23 cases of pneumococcal meningitis and it is hoped that this figure will be higher when all cases receive the penicillin intrathecally.

V.—Gonococcal Infections.

The results of penicillin treatment of gonococcal infection have been extraordinarily good. The cases treated have been all sulphonamide resistant and 125 of 129 cases were free of symptoms and bacteriologically negative within 9 to 48 hours after treatment with 100,000 to 160,000 units of penicillin.

VI.—Meningococcal Infections.

Sulphonamide treatment of meningococcal meningitis has been so satisfactory that insufficient cases have been treated with penicillin to warrant drawing conclusions.

VII.—Sub-acute Bacterial Endocarditis.

17 patients were treated, 10 of the cases showed no appreciable effect on the disease and 3 patients improved temporarily. On the whole the results have been quite disappointing to date. Better results may be seen with larger doses begun earlier in the disease.

General Comment

Penicillin has to date been found to be extremely useful in the treatment of infections due to the pneumococcus, haemolytic streptococcus, the gonococcus, and staphylococcus. It has been most extensively tried in the latter two. It has been of great benefit in those cases that are resistant to sulphonamides. It has not been effective in the treatment of sub-acute bacterial endocarditis.

Toxicity

Toxic effects are extremely rare. Occasional chills with fever, or headache and flushing have been noted. Urticaria has been reported and thrombophlebitis at the site of injection has been described.

In addition to the above sections which have been briefly summarized, the article includes a section on the method of preparing penicillin for treatment and a section which discusses in detail the dosage schedule in various infections.

G.L.S.

OBSTETRICS AND GYNECOLOGY

The Importance of Focal Infection in Obstetrics

Myer Solis-Cohen, M.D., Philadelphia, Pennslyvania

Surgery, Gynecology and Obstetrics, Vol. 78, no. 1, January, 1944

When a focus of infection exists in the body, organisms may remain in that circumscribed area or may spread to other parts of the body. Which of these two alternatives will occur depends upon the resistance of the body. Included among the conditions which decrease the body's

resistance and thus facilitate the spread from a primary focus are pregnancy and the trauma of labour.

Many obstetricians believe that certain of the abnormalities of pregnancy and of the puerperium are caused by foci of infection, but, although they give attention to such foci in the mouth, they tend to ignore the upper respiratory tract.

The conditions which are believed to be caused by focal infections are the following:

1. *Abortion.*

The theory is propounded that bacterial emboli, carried by the blood stream from the primary focus, infect and cause thrombosis of vessels on the maternal side of the placenta, with consequent infarction of a portion of the placenta. Early in pregnancy, when the placenta is still small, the area is likely to be sufficiently large to cause the death of the embryo.

2. *Toxaemias of Pregnancy.*

Infection is believed to play a part in pernicious vomiting, pre-eclampsia, and eclampsia.

3. *Nephritis of Pregnancy.*

4. *Pyelitis of Pregnancy.*

5. *Disorders of the Placenta.*

(*a*) Accidental haemorrhage.

Infection may cause thrombosis of the ovarian or uterine vessels, damming back of blood, haemorrhage, and premature separation of the placenta.

(*b*) Placenta Praevia.

Infection may cause infarction of the placenta. If the area of infarction be at the edge of the placenta, the organ fails to grow at that edge and compensatory enlargement occurs elsewhere. If the ovum has been embedded low in the uterus, such compensatory enlargement of the sound side of the placenta may result in a placenta praevia, either incomplete or complete.

6. *Puerperal Sepsis.*

A certain proportion of cases of puerperal sepsis is undoubtedly due to autogenous infection.

7. *Breast Abscess.*

Cultures from a focus elsewhere and from a breast abscess reveal the presence of the same type of organism too often merely to be a coincidence.

8. *Phlebitis.*

The author emphasizes the risk of operation upon a focus of infection but states that this can be reduced by proper pre- and post-operative care and by gentleness during the operation. The general belief appears to be that dental surgery may be safely carried out during pregnancy. Talbot, however, would confine the removal of foci of infection to the period between the fourth and the seventh months, and he is opposed to such work being performed if there be a toxaemia of pregnancy.

The author in his concept of a focus of infection lays the emphasis not upon the infected *tissue,* but upon the infecting *organisms.* He defines a focus of infection as "infecting bacteria, pathogenic for their host and producing toxins inimicable to him, which have their habitat in a more or less circumscribed area." The importance of this change in emphasis is that, while the surgeon can excise the infected tissue, and drain infected cavities, he cannot remove the focus of infection completely, since some of the organisms always remain in the adjacent tissues. These organisms must be combatted by the body's natural defenses. To this end the use of an autogenous vaccine is advocated, and this must include not only the organism itself, but also its soluble exotoxins.

K.F.C.

SURGERY I.

Management of Varicose Veins in Army Personnel

Major A. S. White, M.C.,
Capt. J. J. Haberer, M.C., and
Major S. Gendel, M.C.

American Journal of Surgery, Jan., 1944

Treatment of varicose veins in the Army presents three problems not encountered in civil practice. First, diagnosis must distinguish true varicose vein cases from orthopedic problems, psychoneurotics, and others with the symptoms of tired, aching, painful legs. Second, diagnostic procedures must be simple, and done with a minimum of equipment. Third, surgical technique must be such as to allow rapid return to full duty.

Criteria for selection of cases. Only those patients are suitable who can return to full duty after treatment for varicose veins alone. Patients with psychoneuroses are frequently encountered. Descriptions are given, by which such patients may be recognized. They must not be operated on and returned to duty, but should be assigned to limited duty or discharged. Many patients with orthopedic conditions, a list of which is given, have associated varicosities. In such cases, the basic condition must be treated first. Associated peripheral vascular disease is a contraindication to surgical treatment of varicose veins in the Army. Such patients, again, should be assigned to limited duty or discharged. Patients with myalgic asthenia, a muscular development unequal to the strain of military life, often seize upon varicosities or other minor defects to explain their inadequacy. Such patients should not be operated upon, but assigned, instead, to less arduous service.

Simple diagnostic manoeuvres. After explaining the fundamental pathology, the authors deplore the multitude of named tests, and present a four-point diagnostic program based on the pathology involved:

1. Is the arterial supply adequate? Test for pulsation in the dorsalis pedis, posterior tibial and popliteal.
2. Is the deep venous circulation patent and adequate? Compress the superficial veins and see if exercise causes the patient pain in the limb.
3. Is the saphenofemoral junction competent? Original Trendelenburg test.
4. Are there any incompetent perforators, and if so, where? With the fossa ovalis pressed upon, apply tourniquets at successively lower levels on the limb, and when the superficial veins fill, between the tourniquet below and the fossa ovalis above, the incompetent perforator has been passed.

Surgical technique. Thrombosis by means of sclerosing solutions is inadequate when the communications between superficial and deep veins are incompetent. Therefore, ligation is necessary. Under local anaesthesia, the great saphenous vein is blocked by double ligatures, and the section between is excised. This is done just below the saphenofemoral junction, if indicated, and at the junctions with all incompetent perforators. The wounds are covered with dry dressings, and the entire extremity covered with a stockinette bandage.

The patient is made to walk the next day. In one week to ten days he can return to full duty. Starting one week after discharge, he returns to the outpatient clinic for a test dose of sodium morrhuate, followed by a course of four to eight weekly injections. The reasons for not giving the sclerosing substance at the time of operation are given fully.

Using the selection methods given earlier, the authors eliminated 917 out of

1,131 cases of varicose veins as candidates for surgery, avoiding much lost time and undue expense now, and many post-war pension claims. The technique outlined above, provided, in the cases operated upon, a safe, adequate, and effective treatment, with no recurrence, a shorter period of treatment, and a smaller number of necessary post-operative injections.

H.K.

SURGERY II.

Unilateral Decapsulation of Kidney for Transfusion Oliguria

Spencer C. Flo and
Harwood W. Cummings
Surgery, vol. 14, no. 2, pp. 216

This article, complete with case history, attempts to point out the indications for renal decapsulation, its modus operandi and especially the advisability of a unilateral decapsulation.

The following theories have been advanced to show why decapsulations are of value for nephritis:

1. Decapsulation relieves renal tension.
2. Operative trauma produces a protein shock.
3. Decapsulation allows oozing from the denuded surface.
4. Operation opens up lymphatic channels from the cortex.
5. Development of a profuse collateral circulation immediately after the operation. This theory is not generally accepted.
6. Decapsulation breaks up the sympathetic plexus passing to the kidney and is almost a sympathectomy. This allows full dilatation of renal vessels to occur.

Anatomically the renal capsule is a fibromuscular hood enveloping the kidney loosely but securely. It is attached at the hilus and covers the renal cortex loosely. Due to this arrangement, the capsule can be readily freed from the surface of the kidney, and thus decapsulation can be done without injury to the parenchyma.

The authors stress that within seven to ten days after decapsulation a new capsule is being formed and that it is complete in about three weeks This new capsule is composed of scar tissue only; it has no elasticity, is firmly adherent to the kidney surface and infiltrates the cortex. It is not possible to separate this new capsule without tearing the renal parenchyma.

Regardless of the mechanism involved in decapsulation, bilateral decapsulation for transfusion oliguria has brought spectacular results. Sometimes in a matter of hours an acute case of oliguria is transferred into profuse diuresis. Despite the immediate benefits, there is little doubt that the kidneys are permanently damaged by the denseness and adherence of the newly formed capsule. Hence after bilateral decapsulation a subsequent embarrassment of kidney function may terminate in death because further decapsulation could not be carried out.

It is pointed out that unilateral decapsulation also produces a marked diuresis. The case history shows this very clearly and further points out that *both* kidneys take part in the diuresis. Hence if both kidneys will respond to unilateral decapsulation, then the authors feel that it is the procedure of choice, for if anything should happen to the decapsulated kidney, there would still be a definite margin of safety in the intact kidney.

Decapsulation is not to be employed until medical and supportive measures fail. The most important medical treatment of oliguria is the intelligent use of fluids. After an arbitrary period of about one week of ineffectual medical and supportive measures, decapsulation should be considered. If decapsulation is too long delayed, death may occur, even after brisk diuresis, due to severe necrosis of the kidney.

R.J.H.

PSYCHIATRY

Manual of Emergent Treatment for Acute War Neuroses

Lawrence L. Kubic, M.D., New York
War Medicine, December, 1943

Introduction

Most war neuroses are acute disturbances and recent work has shown that with adequate therapy, seventy to eighty per cent of such casualties can be returned to active duty in a short time. Much of the emergent treatment of these cases can be handled by non-psychiatrists, and such treatment should be started as near to the combat zone, and as quickly as is possible. Mobile psychotherapeutic units have been suggested.

The topic is dealt with under five main headings.

I.—*The Acute War Neuroses.*

Whereas some cases have inherently weak personalities, most of the cases studied have occurred in men whose emotional make-up was normal. The neuroses develop slowly and insidiously, due to many repeated stresses or emotional shocks, such as fatigue, hunger, narrow escapes from death or injury, and increasing danger. These stresses are accumulative and the increasing tension finally causes a breakdown. An example is cited of the soldier who has a "charmed life," yet knows with each escape his chances of further escape get less and less, finally the tension so produced causes a breakdown.

II.—*Warning Signals.*

These consist of (1) Sleep disturbances and nightmares. Any increased difficulty in sleeping, frequent starting and horrible nightmares should be taken as early signs of a possible "break." (2) Daytime "startle" states. Due to inability to sleep at nights the man rapidly becomes fatigued, with the result that abstracted moments occur when the individual lapses briefly into a half dissociated state. From such states he tends to be startled by sudden noises, movements, etc. (3) Other warning signals:—subtle changes in behaviour such as mannerisms, habits, increased smoking and alcoholism, irritability, seclusiveness or extreme moodiness, or excess talking.

III.—*Preventive Therapy.*

(*a*) Those who have weaker personalities should not be sent into combat. Mild types can be aided greatly by excessive development of the fighting morale.

(*b*) Three necessities are outlined for those who, while mentally strong, seem to be about to break down, due to incessant strain. These are (1) quick sleep, (2) profound sleep, (3) quick waking. Five steps, including technique of sedation, are given as a method of achieving this end.

IV.—*Types of Acute Disturbances.*

Under this heading the author lists ten types of acute war disturbances, varying from the "simple exhaustion" to "acute psychotic and psycho-pathic episodes." The most frequent in occurrence are the "simple acute anxieties," characterized by hypersensitivity to sudden noises, motions or lighting; aimless restlessness; diffuse emotional discharges; and inability to sleep or rest.

V.—*Emergent Treatment.*

In treating these patients 2 important primary considerations must be taken into account. First, the man should be kept as much in contact with reality as possible; and secondly, he should be prevented from influencing others. A happy medium must be drawn between these.

All treatment can begin right at the

combat zone, most can be completed near the front, but some of the more severe cases, and the psychotics, require treatment at base psychiatric centres.

(*a*) Early treatment: to control fatigue, hunger, and tension.

Step 1.—Primary treatment:

(1) Controlled sleep, sedation.

(2) Physical restoration, adequate diet.

(3) Occupational therapy.

Step 2.—Superficial catharsis.

(1) Companionship.

(2) "Gentling."

(3) Skilled catharsis.

(*b*) Later treatment: for more severe cases.

Step 3.—Prolonged sleep under narcosis.

Step 4.—Group methods, occupation, lectures, etc.

Step 5.—Deconditioning procedures.

Step 6.—Hypnonarcoanalysis.

Step 7.—Shock therapy.

T.E.H.

HYGIENE

The Social Aspect of Our Syphilis Problem

Grant Fleming, M.C., M.D., D.P.H., F.R.C.P.(C.).

Canadian Journal of Public Health, November, 1943

The syphilis problem is one of immense proportions. The Surgeon-General of the United States Health Service states that lues is contracted by one of every ten adult Americans before they reach the age of fifty. It has been estimated that five per cent of the Canadian population has syphilis. The disease is widespread and chronic, and is one of the most prevalent of the communicable diseases. It ranks with the four leading causes of death in the Dominion. It reduces life expectancy markedly, striking the patient when he should be at the peak of his earning power and reducing or abolishing his usefulness.

Among treated and inadequately treated patients, between 10 per cent and 15 per cent develop luetic cardio-vascular disease, and more than 15 per cent get symptomatic neurosyphilis. About 15 per cent of blindness is due to the spirochetes. One-tenth of the first admissions of males to mental hospitals are cases of general paresis. Of untreated syphilitic mothers, only 17 per cent give birth to non-syphilitic offspring and 5 to 10 per cent of cases of lues are antenatal.

The disease is very costly. In the city of Montreal alone, the annual expenditure for treatment and control is at least $500,000, most of which is used for the hospitalization of late luetics.

The conditions, briefly, sketched in the foregoing paragraphs indicate that the problem presented by syphilis is one of such magnitude that energetic community effort is needed in the approach to the solution. The spread of the disease is related to sexual activity, which has its own problems, independent of matters of health. In a given group of people, the incidence of syphilis is an index of sexual promiscuity, upon which it depends for dissemination. In the non-promiscuous the disease dies with the patient and is not spread. If prostitution were controlled, the sources of many infections would be stamped out, but this cannot be done by suppression alone, since those associated with prostitution will not co-operate but will conceal their activities.

Many methods of attacking the problem are employed. These include:

(a) *Prophylaxis.* This is of value only when it can be enforced, as in the Armed Forces, and even then it often fails because

of the influence of alcohol or optimism which lead to foolhardy behaviour.

(b) *Sex Education.* It is not sufficient to teach merely the fundamentals of reproductive physiology, but one must also provide opportunity for the instructed to discuss sex in relation to other parts of social behaviour and to embody the information acquired into their general fund of working knowledge. Fear must not be employed since it does not remain a strong deterrent to promiscuity and it is readily relieved by alcohol. It is the responsibility of medical personnel to assist parents and others to understand growth and development in children and adolescents and to guide it tolerantly.

(c) *Case Finding.* All sexual contacts for the three months previous to the onset of infection, and all contacts after the recognition of infection, must be investigated. It is in this matter that the general practitioner is often negligent. Serological surveys are very valuable in large groups and clinics.

(d) *Legislation.* The legislation must be drafted by men familiar with the control of venereal disease. The purpose of regulations is to supplement education and to provide power to deal with irresponsible intractible cases. It should not authorize generalized compulsion. In Great Britain and the Netherlands, compulsion has been abandoned and emphasis has been placed on education. In these countries there are attractive free clinics for diagnosis and treatment. Their results compare favourably with those of other territories where compulsion is enforced.

The law ought not to standardize methods of diagnosis and treatment, other than to outline recognized procedures. There should be no attempt to categorize patients medico-legally. Too much emphasis should not be placed upon any one diagnostic or therapeutic measure. The law should require the reporting of the disease and its treatment by a licensed practitioner, the examination of contacts, and the protection of the rights and freedom of the patients. Regulations are for the control of a communicable disease and not for the punishment of a moral delinquent.

Discriminatory legislation should not introduce prejudice in a legal court or prevent luetics from engaging in occupations, the safety and efficiency of which is not influenced by the patient's disease.

(e) *Public Education.* The necessity for public education with respect to the problem faced by departments of health is obvious. In a recent survey in 35 centres in the United States it was shown that 65 per cent of "men on the street" would seek treatment of venereal disease at a drug store or would treat themselves. It is essential to teach facts about the disease, its mode of spread, and the importance and practical details of treatment.

W.J.H.

PAEDRIATICS

Treatment of Epidemic Diarrhoeas and Dysenteries in Infants and Young Children

Glaser and Bruce
J. of Paedriatics, January, 1944

Diarrhoeas and dysenteries in new-born infants, infants and young children are responsible not only for long illness and hospitalization but also for many deaths each year. The majority of cases are treated by practicing physicians, only the more severe cases being referred to hospital.

The authors discuss certain changes in the orthodox treatment which have significantly decreased the mortality and hospitalization time and considerably simpli-

fied the management of the case in homes with untrained nursing staff. They divide their cases into two groups: In the first, those whose origin is improper nutrition or parenteral infection are placed; the second contains all patients with "specific" diarrhoeas caused by organisms of the dysentery group. Except for the isolation technique observed in the latter and the different solution of sulphonamides, the same treatment is applied to both groups.

Outline of Treatment

(1) *Starvation period.*

A 12-hour period of rest is provided for the irritated intestines. During this time only water and nutrition as needed are provided.

(2) *Oral and intravenous hydration.*

Dehydration is the most dreaded complication of diarrhoea. Plain sterile water is presented at 15 to 30 minute intervals and the child encouraged to drink even if resistance is offered. Intravenous fluid is given in cases of advanced dehydration or acidosis.

(3) *Feeding.*

It has been customary to offer and give only small amounts of milk per feeding, measured exactly and with careful supervision, and to increase the amount very slowly and under strict regulation. The authors have abandoned this procedure entirely. At the end of the starvation period, buttermilk, skimmed boiled milk or protein milk are offered at 3- to 4-hourly intervals, the amount regulated entirely by the appetite of the child—no limitation, no forcing. It is this measure, in particular, which has decreased the time of illness and simplified treatment in the home.

(4) *Sulphonamides.*

Sulphathiazole is used for the non-specific type of diarrhoea, sulphaguanidine for the dysentery group.

(5) *Plasma and whole blood transfusion.*

After hydration has improved, whole blood transfusion is of greatest value in increasing the child's resistance and improving his general condition. Where haemoconcentration is too high, plasma is given.

(6) *Bismuth and paregoric.*

These are employed only in extreme treatment-resistant cases.

J.C.L.

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LANGUAGES OF EXAMINATION

Candidates at the time of making application for either the Primary or the Final Examination shall indicate whether they desire to be examined in the French or English language.

STANDARDS OF QUALIFICATION

No particular list of text books or syllabus is recommended to cover any subject. All candidates are expected to demonstrate a thorough knowledge of the subjects in which they are to be examined and to be familiar with the current literature relating thereto.

In their answers, written or oral, candidates in the Final Examination must show evidence of critical judgment.

PLACES AND DATES OF EXAMINATIONS—1944

The Centres selected for the Written Examinations are Vancouver, Edmonton, Saskatoon, Winnipeg, London, Toronto, Kingston, Montreal, Quebec, and Halifax—October 2nd, 3rd and 4th.

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It Can Happen Here

Example of severe rickets in a sunny clime.

LEST WE FORGET—we who are of the vitamin D era—severe rickets is not yet eradicated, and moderate and mild rickets are still prevalent. Here is a white child, supposedly well fed, if judged by weight alone, a farm child apparently living out of doors a good deal. This boy was reared in a section having a latitude between 37° and 42°, where the average amount of fall and winter sunshine is *greater than that in the major portion of Canada.* And yet such stigmata of rickets as *genu varum* and the quadratic head are plain evidence that rickets does occur under these conditions.

How much more likely, then, that rickets will develop among city-bred children who live under a smokepall for a large part of each year. True, vitamin D is more or less routinely prescribed nowadays for infants. But is the antiricketic routinely administered in the home? Does the child refuse it? Is it given in some unstandardized form, purchased from a false sense of economy because the physician did not specify the kind?

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Rachitic changes were present as late as the fourteenth year, and the incidence was higher among children dying from acute disease than in those dying of chronic disease.

The authors conclude, "We doubt if slight degrees of rickets, such as we found in many of our children, interfere with health and development, but our studies as a whole afford reason to prolong administration of vitamin D to the age limit of our study, the fourteenth year, and especially indicate the necessity to suspect and to take the necessary measures to guard against rickets in sick children."

*R. H. Follis, D. Jackson, M. M. Eliot, and E. A. Park: Prevalence of rickets in children between two and fourteen years of age, Am. J. Dis. Child. 66:1-11, July 1943.

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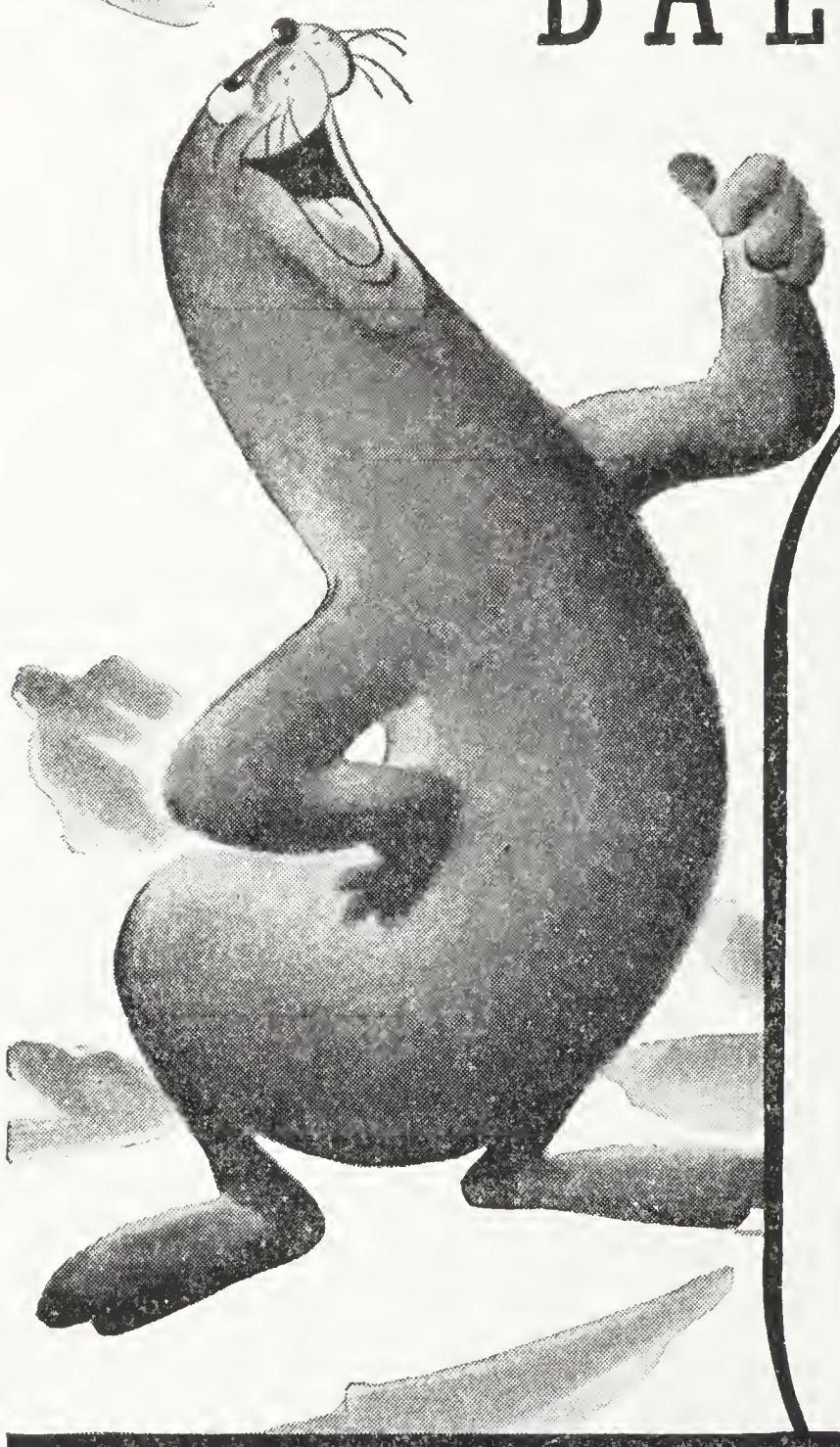

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Vitamin C	35 mg.

A balanced preparation of essential vitamins

SUPPLIED IN BOTTLES OF 6 AND 100

*J.A.M.A. 119:948 (July 18) 1942.

"SUPPLAVITE"

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